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HUMANIZING HOSPITAL EXPERIENCES

Presidential Address

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ON THE morning of May 15, 1947, I found on my desk two messages. One was a telegram signed by 27 of my present and past associates in pediatrics at Yale University School of Medicine informing me of my election to the presidency of the American Pediatric Society. The other message was a letter from a father telling me of the gratitude which he and his wife felt for the kind of service they had received in our hospital during the illness, fatal though it was, of their attractive adolescent daughter.

I am glad that I did not have to decide which of these messages moved me more deeply. As to the first, I thank you for the honor you have conferred in choosing me as your president. As to the message from the grateful parents, it suggested the theme for a few remarks on humanizing hospital experiences for patients, parents and staff. As Dr. C. A. Aldrich said of babies, so should we be able to say: "Hospitals are human institutions!"

ENTER PATIENT

The morning mists still haunt the stony street:
The northern summer air is shrill and cold;
And lo, the Hospital, grey, quiet, old,
Where Life and Death like friendly chafferers meet.
Thro' the loud spaciousness and draughty gloom
A small, strange child—so aged yet so young!—
Her little arm besplinted and beslung,
Precedes me gravely to the waiting-room.
I limp behind, my confidence all gone.
The grey-haired soldier-porter waves me on,
And on I crawl, and still my spirits fail:
A tragic meanness seems so to environ
These corridors and stairs of stone and iron,
Cold, naked, clean—half-workhouse and half-jail.

—*William Ernest Henley*[1]

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In these words, the poet in 1873 expressed his reaction to observations made during a sojourn under Lord Lister's care in an Edinburgh hospital. It is my desire to express my own reactions to a few aspects of hospital care for children. Methods and attitudes in this matter are parts of the broad subject of medical education, whether a pediatrician works in a "teaching hospital" or in one not technically so designated.

At the outset, I should like to stress the fact that I am not attempting to prove anything. Certain truths are well known, accepted, reasonable; yet they are frequently ignored in conduct as being too simple and obvious. Some of these truths I wish to emphasize because, in my opinion, they are too vitally important in child health to be slighted or treated casually. Of course, the primary responsibility of a pediatrician is to provide promptness, intelligence and resourcefulness in the diagnosis and treatment of sick children.[2] In addition, he should undertake, as part of a many-sided responsibility, to promote health, happiness, security and freedom from needless tensions and strains in his patients. He should endeavor not only to make painful items in the broad area of pediatric ministration as bearable as possible, but to develop from these experiences something of value for the many persons involved—patients, parents, physicians, nurses, students, attendants.

This conception may be regarded as mental hygiene; however, I am assuming it to be the natural aspiration and way of life of a physician to children concerned in forwarding their health and welfare in family, school and community.

Concerning the ultimate effects of painful experiences inherent for most children at some time or other in the modern medical care program, I am aware that there are conflicting and confusing thoughts and theories. It might be inferred from the work of Conel[3] that the painful experiences to which the young infant (under 3 months of age) is subjected may prove not to be traumatic for his future emotional development because of the immaturity of his cortex, particularly the frontal lobes. However, as Putnam[4] suggested, there is "the possibility that painful experiences may be registered subcortically and these may be the very ones most difficult to modify in later life." I do not know where the exact age line may be drawn in each individual case so that one can

1. Henley, W. E.: (*a*) Poems, New York, Charles Scribner's Sons, 1912; (*b*) quoted by Goldwater, S. S., in Bachmeyer, A. C., and Hartman, G. G. F.: The Hospital in Modern Society, New York, The Commonwealth Fund, 1943, p. 668.

2. Crothers, B.: A Pediatrician in Search of Mental Hygiene, New York, The Commonwealth Fund, 1937.

3. Conel, J. L.: The Postnatal Development of the Human Cerebral Cortex: The Cortex of the Three-Month Infant, Cambridge, Mass., Harvard University Press, 1947, vol. 3.

4. Putnam, M. C.: Personal communication to the author.

know just when painful procedures will or will not influence behavior in later life. No one would question the fact, probably, that no period of life is too young for the development of conditioned patterns of behavior in the child. Innocence cannot be claimed for the effects of pain to the child on the parents, nurses and physicians participating in and witnessing the trauma. For those who hold that toughness is necessary in the management of children in order to develop strength of personality, I should observe only that this fast-moving, confused, insecure and anxiety-ridden world affords abundant and unavoidable facilities for tests of strength and fortitude besides those coming within the field under present discussion. Let there be no "taboo on tenderness!"[6]

How we regard little children—we pediatricians—as reflected in a multitude of noted and unnoted words, attitudes and deeds, sets a pattern with which we too little reckon—a pattern for parents, students, nurses and fellow physicians. In my philosophy, our example is our only way of humanizing, if we do so even slightly, this distraught world. Pediatrics is no longer the "study and prevention of infant mortality"; the prospects for wholesome life must be good, else the prospect for death may be preferable. In the words of Frank:[7]

> The capacity for sensitive feelings, for love, affection, and for respect for others is the basic dimension of a human society and must be developed in childhood if it is to operate in the lives of adult citizens. Intelligence, rationality and skills, like science and technology, are but servants of the feelings and values that govern the individuals who use them. If we cherish any hopes for the future and seek a society dedicated to human values, our educational process in the home and in the schools must accept this responsibility for developing the sensibilities and communicating the insights that will conserve and extend those values.

Many hospitals began as almshouses for the creature care of the indigent, aged and infirm. They have become through the centuries and at their highest levels, great, all-embracing institutions for the care of the sick of all types, of all ages, of all economic classes; for the study of disease and human development; for the training of medical students, nurses and various other professional and technical personnel. Too frequently, however, hospitals and "medical centers," so called, are so depersonalized, so mechanized, that many patients and their relatives feel acutely that the institutions exist for the sake of routines, procedures, administration and personnel rather than for the sake of the sick, who are uncomfortable, lonely, bewildered and anxious about the many things which depend on health.

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5. Deleted by author.

6. Suttie, I. D.: The Origins of Love and Hate, London, George Routledge & Sons, Ltd., and Kegan Paul, Trench, Trubner and Co., Ltd., 1935, chap. 6.

7. Frank, L. K.: Children in a World of Violence, Progr. Educ. 17:393 (Oct.) 1940.

This development has come about in part because modern medicine depends less on highly individualized practice than on teamwork and laboratories—to which magnificent achievements must be credited. However, even in the framework of group study and institutional care, a few features which on children's services are amenable to humanizing touches should be considered.

THE ROOMING-IN PLAN

Attention may be directed first to procedures associated with hospitalization of the lying-in mother and newborn baby. There was a time when hospitalization of women in the lying-in period was fraught with great danger to physical health and when good sanitation and antisepsis were difficult goals to achieve. Since aseptic technics have become established, more and more deliveries have taken place safely in institutions; in some states more than 95 per cent of women are so delivered. Most of these deliveries are "normal" as contrasted with the pathologic ones in hospitals of an earlier era. Unquestionably, delivery in the hospital, along with other developments in medicine and nursing, has contributed to a reduction in neonatal and maternal mortalities. However, it would seem that for a process which in about 80 per cent of cases is a normal physiologic one, the whole procedure has been made quite artificial by modern practice. Persons in many professional categories have rebelled at this artificiality and have sought to give recognition to normal human desires and cravings as well as to surgical asepsis, in the name of which present practice has developed. Many women have the instinctive creature reactions of the parturient female; so, also, do their consorts and their offspring have instinctive reactions. I do not know what all these reactions and cravings are, but I have learned from mothers and fathers who have been allowed in the hospital to see, to fondle, to care for (with assistance) their newly born child practically from the moment of birth that they experience deep human satisfactions which may have, quite conceivably, vital emotional values in subsequent parent-child relationships. The child also, I believe, has its own instinctive cravings with respect to its mother, which are gratified by nursing and nestling; however, this statement is not proved to every one's satisfaction. Cultural anthropologists have made valuable observations in their field, but there is wisdom in the words of the Indian poet (Jalaluddin Rumi:[8])

> When a mother cries to her sucking babe, "Come, O son,
> I am thy mother!"
> Does the child answer, "O mother, show a proof
> That I shall find comfort in taking thy milk?"

8. Rumi, cited by Huxley, A.: The Perennial Philosophy, New York, Harper & Brothers, 1945, p. 139.

At Yale, a program designed to foster parent-child intimacy in the hospital from birth to discharge has been developed under the direction of Dr. Edith B. Jackson and has been in operation for almost two years.[9] The program was a logical outgrowth of her experiences as psychiatrist on the pediatric staff. After a survey of problems in the homes of newly born infants shortly after their discharge from the hospital, it was evident to Dr. Jackson that many mothers and fathers were failing to realize the anticipated satisfactions of early parenthood. Often their disappointments developed in association with their inability to recognize and handle the ordinary creature needs of their offspring, particularly when the child was a first-born. Nursing, inability to nurse, painful nipples, bottle feeding, elimination, bathing, crying, sleeping, colic, regurgitation, rashes, pseudophimosis—all those so-called little matters pertaining to parentcraft, which physicians too often assume will be understood and taken in stride by their mother and father, become sources of anxieties mounting in some cases into serious family disharmonies.

An attempt was made by Dr. Jackson (1938) to meet the problem by informing the mother at the time of discharge that she could call the pediatric nursery intern regarding any difficulties she might encounter and that in any case the physician would visit the mother in her home within a few days and thereafter from time to time until the child could be taken to the well baby conference.[10] These are large responsibilities to place on an intern even with guidance from the senior staff, but the great educational value to him[11] is obvious—it is as great as can be obtained from any form of pediatric experience.[12]

Valuable as this approach was to parents, child and staff and in the humanization of the hospital in this regard, the remedy was not adequate. Essential opportunities for the mother and father to get acquainted with their offspring and with its care while mother and child were still sheltered in the hospital were lacking. The next step was to set up a four bed unit (1946) where the mother and baby could be to-

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9. Jackson, E. B.: Should Mother and Baby Room Together? Am. J. Nursing **46**:1 (Jan.) 1946. Jackson, E. B.; Olmsted, R. W.; Foord, A.; Thoms, H., and Hyder, K.: The Evolution of a Rooming-In Unit for Mothers and Babies, Pediatrics **1**:28 (Jan.) 1948.

10. Jackson, E. B.: Prophylactic Considerations for the Neonatal Period: Development of Home Visit Plan for Pediatric Interns, Am. J. Orthopsychiat. **15**:89 (Jan.) 1945. This program was made possible by the gift to the Department of an automobile by Dr. Ethel C. Dunham.

11. Wessel, M. A.: Pediatric Intern, J. Pediat. **29**:651 (Nov.) 1946.

12. My associates and I have observed since World War II was concluded that members of the junior staff are relatively mature and experienced; many are parents themselves and are consequently more acutely aware of the importance of this responsibility.

gether, from birth if desired, the mother caring for her child (in part), listening to it, observing it, feeding it, fondling it and sharing these experiences with her husband during his daily visits to her and the baby; thus, rooming-in is, in our hospital, a coeducational institution. The unit, financed in part by a gift from Mead Johnson and Company, Evansville, Ind., has its staff of understanding counselors who are unwilling to regard any question which the mother or father of a newborn baby asks as inconsequential or trivial.

Pediatricians used to advocate breast feeding primarily to promote physical health, and thus to insure a high survival rate. Like many of my colleagues, I am now experimentally interested in self-demand breast feeding in individual cases as a function which may minister to healthy emotional life for mother and baby, and therefore for the entire family group. Preparation for breast feeding begins in pregnancy, with members of the family, the obstetrician and the pediatrician each contributing their several parts toward establishment of this physiologic process. A hospital procedure such as rooming-in promotes natural, happy relationships, and thus fosters maternal nursing to the extent that the mother, in many instances, is satisfied, at ease and free from worrisome imaginings about her baby.

Some women do not wish to suckle their babies; others accept the role on an intellectual level but actually find the process distasteful. In general, one should realize that some women are not prepared in all respects for mothercraft. However, one must not forget or ignore the mother who is well prepared for motherhood and does not wish to feed her child artificially but, rather, desires to nurse it at her breasts; she should be given every encouragement.

Rooming-in is now planned for, or is already functioning, in several medical centers; it is growing in popularity, not as a fad, but as a normal reaction to human cravings experienced by many men and women newly become, or about to become, parents. Physicians and hospital administrators are not creating something new; they are simply adapting old folkways of the home to fit in with the requirements of modern medical and hospital technics. Europeans are familiar with rooming-in in some form.[13] All who are interested in child health grasp at any procedure which gives reasonable promise of nurturing parental confidence and security and family unity; rooming-in is surely promoting mental hygiene at the "grass roots."

The rooming-in program has obvious educational values for personnel in various categories; I also call attention to its integrating force in

13. (*a*) Illingsworth, R. S.: Personal communication to the author (*b*) Spence, J. C.: The Care of Children in Hospitals, Brit. M. J. 1:125 (Jan. 25) 1947.

respect to obstetrics, pediatrics, nursing and administration. Rooming-in as set up in our unit cannot function in sections. It has been my good fortune to work in an institution where the liaison between pediatrics and obstetrics has been close, beginning actually in the prenatal clinic. I bespeak this harmony for all hospitals and medical schools; there must be integration of the program for mother and for child if they are to have value and effectiveness. One turns back, with some nostalgia, the pages of medical history to the days when there was a single professor of "midwifery and diseases of women and children." Pediatrician and obstetrician must function in close association in all that pertains to the care of the newborn child and its mother. To those who are teachers in medical schools, this practical setup—rooming-in—provides evidence in a concrete pedagogic form of the importance attached to the areas of maternal and child health and mental hygiene and to an integrated approach to them.

In our unit no harmful complications and sequelae have developed to date. Although the child is handled by mother and father in fondling and giving care, contacts with other persons, including fellow newborn infants, are fewer. As to infections of the respiratory system, or other communicable diseases, the fathers are especially protective of mother and child at this special time and are not likely to present themselves if ill. As to dreaded infections of the newborn—impetigo and epidemic diarrhea—future records could hardly be worse than those of the past for the congregate nurseries, in which morbidity and mortality, indeed, may be rising. I believe that epidemic diarrhea has rung the death knell for such nurseries, and I venture to predict that the rooming-in plan will prove to be safer than any other hospital arrangement for care of the newborn.

Much practical interest has been stimulated by the obstetric procedures developed in England by Dr. Grantly Dick Read and described in his book.[14] Developments along this line tie in closely with the ideals and purposes of rooming-in and with the humanization of hospital procedures, as we have observed from practical experience in the obstetric service in our institution.

OUTPATIENT CLINIC

Most outpatient pediatric clinics do not lack opportunities for introducing humanizing changes in their procedures. If, as is true of many medical schools, experience with outpatients is given to senior trainees, it affords the student his first opportunity to apply previously acquired knowledge and skills in diagnosis, therapy, psychology, social service and public health. Knowledge must be brought into practical relation with

14. Read G. D.: Childbirth Without Fear: The Principles and Practice of Natural Childbirth, New York, Harper & Brothers, 1944.

the complaint which brought the child to the hospital and with the facts of family and community life. With relevant data and with collaboration of the social worker, an effective plan of procedure is worked out and implemented. Thus, the student is at last functioning as if he were an official physician, and the example set by his preceptors and by hospital procedures are patterns for his future performance. Is respect for the personality of each patient and for that of his parents an integral part of these patterns?

I will point out three areas in outpatient work in which the best that one can achieve in the way of example will be none too good. The first two areas concern preceptors, and the third concerns hospital administration.

The bulk of outpatient pediatric practice and of most private practices is comprised of so-called minor complaints, those of psychosomatic disorders, of headaches, eyestrain, phimosis, rashes, abdominal pain, vomiting, constipation, "pain in the side," poor posture, obesity, skinniness and refusal to eat; in addition, there are the frank behavior problems, reading disabilities and mental deficiency.[15] All medical students and physicians are interested in the relatively rare dramatic illnesses—meningities, lobar pneumonia, appendicitis—for which, in the main, there are clearcut, effective therapeutic methods. But are other patients—the many—just derelicts, to be passed about from one special clinic to another? Or are they human beings needing accurate differential diagnosis, intelligent study and careful treatment, patiently and sympathetically carried out? To be a successful preceptor in this area requires the ability of a master clinician and the resources of an accomplished pedagogue! No staff member should be more carefully chosen; in his own thinking and performance he should be the embodiment of Peabody's dictum that the "secret of the care of the patient is in caring for the patient."[16]

A second point regarding humanization of teaching has to do with the patient's presence at discussions and history taking—one of the most exacting, disturbing and vital of all medical technics.[17] The matter requires evaluation, I think, in each individual instance. It is wise to remember that the Puritan fathers regarded the child as a miniature adult, able to receive the same strong gospel. I am convinced that young chil-

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15. Powers, G. F.: School Health Problems as Seen in a Pediatric Clinic, Connecticut M. J. 9:11 (Jan.) 1945.

16. Peabody, F. W.: Doctor and Patient: Papers on the Relationship of the Physician to Men and Institutions, New York, The Macmillan Company, 1930.

17. Kahn, E., and Powers, G. F.: Bedside Teaching: Consideration of the Patient's Emotional Response to Case Discussion, J. A. M. A. 107:639 (Aug. 29) 1936.

dren understand more of our words than we realize; a great deal of information and misinformation reaches them by the inflection of the voice, by actions and manners and by general demeanor. I think one may wisely assume that much is comprehended, without trying to establish the age of understanding too sharply; one should indulge in discussion in the child's presence only when what is said may bring relief and comfort to the patient. However, it is important for the physician to explain at an appropriate time to the child of comprehending age something of the nature of his illness and of his treatment.

In respect to hospital administration relevant to the topic, I regard the existence of an appointment system for seeing outpatient clientele as essential to respectful management of child and parent, to the rendering of good medical care and to the proper teaching of medical and nursing students.[18] This system is necessary for high morale in the staff; nothing is more conducive to slipshod work on the part of personnel of all categories than a waiting room crowded with crying babies, restless run-about children and disgruntled parents, who have many other responsibilities to meet in practical living in addition to the one at hand.

A further item of importance regarding the appointment system is the equitable and selective distribution of patients for teaching purposes. The system is not necessarily utilized in simon-pure form; there are certain psychologic and pedagogic values in assembling in special clinics small groups of patients (and their parents) having similar ailments, such as diabetes, tuberculosis, rheumatic fever, heart disease and allergic conditions. Nursing and social service contacts in some of these groups as groups are often indicated and facilitated. Interfamily acquaintance when children have the same maladies has certain assets. For some of these groups organized play and occupational therapy are most helpful.

INPATIENT SERVICE

So far as my topic applies to inpatient service, I direct your attention to admitting experiences, visiting, "mothering," "needling," profitless routine procedures and fear of death.

In the present form inpatient children's services are of relatively recent development. To the founder of the first dispensary in Great Britain for children, George Armstrong, the idea seemed absurd.[19] In 1772, he wrote as follows:

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18. Dunham, E. C.: Appointment System in the Children's Clinic of the New Haven Dispensary, Mod. Hosp. **21**:87 (July) 1923.

19. Still, G. F.: The History of Paediatrics: The Progress of the Study of the Diseases of Children up to the End of the Eighteenth Century, London, Oxford University Press, 1931.

Several Friends of the Charity have thought it necessary to have a House fitted up for the Reception of such Infants as are very ill, where they might be accommodated in the same Manner as Adults are in other Hospitals. But a very little Reflection will clearly convince any thinking Person that such a scheme as this can never be executed. If you take away a sick Child from its Parent or Nurse you break its Heart immediately: and if there must be a Nurse to each Child what kind of an Hospital must there be to contain any Number of them? Besides, as in this case the Wards must be crowded with grown Persons as well as Chidren must not the Air of the Hospital be thereby much contaminated? Would not the Mothers or the Nurses be perpetually at Variance with one another if there were such a Number of them together? Would not the Children almost constantly disturb each other with their Crying? Supposing only a few in one Ward should be taken ill of a Vomiting and Purging, to which Infants are so very subject, would not this presently infect the Air of the Ward and very probably communicate the Disorder to other Children confined there? Yet this is one of the principal Diseases where an Hospital might be of Service to Infants, were it not for insuperable Objections just now mentioned. Add to all this it very seldom happens that a Mother can conveniently leave the Rest of her Family to go into an Hospital to attend her sick Infant.[20]

The process by which children are admitted into an emergency room or a ward of a hospital is often a formidable and barbarous performance; the procedure too often is thoughtlessly and unnecessarily cruel. Neither parent nor child is prepared by any one for what is to take place; little or no care is exercised as to the frightening sights the child will (but need not) witness or the terrifying words and sounds he will (but need not) hear before he is taken, against his wishes, from the security of the family group into the great unknown of the hospital ward. The proceedings, even if they do not "break" the child's "heart immediately," are traumatizing to all unhardened witnesses, be they orderlies, nurses, students, members of the house staff or attending physicians, to say nothing of parents, whose only resource in frantic efforts to comfort the terrified victim is too often one lie after another.

It would be helpful if, when the patient is brought to the ward, the mother introduced the child to the nurse in charge and told her in the child's presence of his practical habits, likes and dislikes, thus establishing a friendly link between mother and nurse. This accepting (by the patient) relationship should be transmitted down the line to the student nurses. The mother should be allowed to help the nurse in establishing the patient in his bed whenever possible.[4] The favorite toy should always be admitted along with the patient.

I regard parents who are going through the process of having their sick child admitted to an institution as emotionally ill themselves and treat them so. The prolonged waiting periods which they are obliged to undergo, the admitting red tape and the contacting and talking with numerous physicians, nurses and clinical clerks are causes of pain and

20. However, even in modern times, mothers do sometimes go into the hospital to attend their sick infants.[13b]

anguish and warrant just criticism. Much, but not all, of the admitting procedure, history taking and preliminary examining is essential to adequate medical care, but thoughtful and sympathetic consideration of "the other fellow" will lead to simplification of machinery and to lubrication of it with kindness and understanding. Necessary inquiries regarding financial matters should be conducted in private—never in a public room. Good "admitting" is a difficult process and calls for experience and wisdom. On the administrative level, it should be done by a person with a background of training in social service, for involved are not only intimate institutional relations, but important relevant contacts with extramural physicians and with public health and social agencies.

Discharging patients also is an important experience in human and medical relations; it is the occasion for case summarizing and for effective interpretation and implementation of therapy, in collaboration with the social worker who has already prepared the field. Discharge of a patient "against advice" in written form is rarely wise and is justified only by legal considerations; it is frequently inimical to the future welfare of the patient and is always to be regarded as an admission of failure on the part of the hospital staff.

As to visiting of patients in a children's ward, the procedure is rarely satisfactory to any group concerned. This year in our hospital we are trying the plan of daily half-hour visits at a stated time for such parents as choose to come; the interns are available for interviews at this time. The same rule applies in the "isolation" pavilion as elsewhere. Parents are encouraged to bring toys or other presents to their children. To date, every one concerned is most enthusiastic over results. Contrary to Armstrong's fear, our nurses do not find that they and the mothers are "perpetually at variance with one another"—quite the contrary. Miss Alice Grant,[21] at that time (1943) one of our social workers, well described the tensions and anxieties of parents during a severe epidemic of poliomyelitis in our hospital and demonstrated the great assistance which can be rendered to them by social workers at a period when visits to the hospital must be greatly restricted.

As to Armstrong's fears of infecting the "Air of the Ward" and communicating "Disorders," we may need aerosols, gamma globulin, antibiotic substances and sulfonamide drugs to permit daily visits by parents to our isolation pavilion, but our fears in the past seem to have been exaggerated regarding visiting as a source of cross infection.

Some children do not seem to desire visits from their parents and cry when they come. This attitude does not indicate they they should not see each other; too little is known of the suppressed feelings and im-

21. Grant, A. A.: Medical Society Work in an Epidemic of Poliomyelitis, J. Pediat. **24**:691 (June) 1944.

aginings of children under these circumstances to interpret their meanings surely; it is better not to contribute in an arbitrary fashion to unnecessary breaks in family bonds. There are a few instances of psychosomatic disorders when, for purposes of diagnosis or therapy, a temporary isolation from family is indicated; but for the run-of-the-mill patient, if there be such, the family tie should be strengthened, not weakened. The admitting procedure is humanized when the parents can promise the distraught child that they will come to see him on the morrow—and are permitted to keep the promise.

Perhaps this point is as suitable as any other to mention the subject of "mothering," whether done by parent, physician or nurse. The topic was well discussed by Brennemann,[22] by Bakwin and Bakwin[23] and by Spitz,[24] and I shall simply emphasize its importance. I have no doubt of the existence of "loneliness"[25] in infants and children and its deleterious effect on the physical condition of some such children. Recovery is often expedited by frequent visiting and fondling by parents. Cuddling and attention by physicians and nurses, as well as by parents, should be encouraged. However, some sick children on their admission to hospital apparently desire to be left to themselves for a few days until they get acclimated to hospital life. Mothering and visiting of the sick child, after all, are but part and parcel of the same demonstration of warmth and affection made possible for the newborn by the rooming-in program.

In respect to painful diagnostic and therapeutic procedures, many of them are disturbing to a greater or less degree to many children.[26] "Needling" in manifold forms is a *sine qua non* of modern medicine, the amount of emotional trauma varying with the skill of the nurse and physician, the psychologic makeup of the patient and the nature of the procedure. Some interns, specially gifted, have a way with them so that they are able to consummate venipunctures, tuberculin tests and lumbar punctures with little obvious upset of the child. I believe that practically

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22. Brennemann, J.: The Infant Ward, Am. J. Dis. Child. **43**:577 (March) 1932.

23. Bakwin, R. M., and Bakwin, H.: Psychologic Care During Infancy and Childhood, New York, D. Appleton-Century Company, Inc., 1942.

24. Spitz, R. A.: Hospitalism: An Inquiry into the Genesis of Psychiatric Conditions in Early Childhood, in Freud, A.; Hartmann, H., and Kris, E.: The Psychoanalytic Study of the Child, New York, International Universities Press, Inc., 1945, vol. 1.

25. Bakwin, H.: Loneliness in Infants, Am. J. Dis. Child. **63**:30 (Jan.) 1942.

26. Fries, M. E.: Psychosomatic Relationship Between Mother and Infant, Psychosom. Med. **6**:159 (April) 1944. Jackson, E. B.: Treatment of the Young Child in the Hospital, Am. J. Orthopsychiat. **12**:56 (Jan.) 1942. Huschka, M., and Ogden, O. S.: The Conduct of a Pediatric Prophylaxis Clinic, J. Pediat. **12**: 794 (June) 1938.

all children should be prepared for procedures, painful or otherwise, by intern and nurse working in harmony. The information should be individualized as much as possible and need not be given too far in advance of action. To me it seems wiser for the child to be worried somewhat by what one says by way of preparation than for him to lose faith in fair dealings by one's "springing" something on him, an act he will regard as trickery. I may add that the child should be prepared for admission to and living in a hospital by the parents, either working alone or with the physician, social worker or nurse. Many difficulties in feeding and in regard to urinary and fecal retention or incontinence could be prevented and agony to the child eliminated if preliminary acquaintance of the patient with the hospital setup was made by parents and nurses.

Concerning psychic trauma of operations, based on a study of 124 of his own cases, Dr. David Levy[27] stated that prevention seems to consist of the following steps:

1. Postponement of the operation, if possible to at least the age of 3 years [before that time the child's "security in life is invested to the highest degree in home and mother"].

2. An explanation to the child of what is to take place, to overcome reactions to the strange or surprising event.

3. Contact with the mother before and after the operation.

4. Preparatory sedative and anesthetic in the bedroom, to spare the child the experiences of seeing instruments and the operating room and riding through corridors.

I believe as fully as any one can in careful physical examinations, but I believe also in being an opportunist where reasonably indicated. I do not think good medical practice requires one to look at once at the ear drum membranes or the pharynx of a frightened child who hates throat sticks and whose history and appearance suggest a diagnosis of congenital heart disease. Examinations done under duress are unsatisfactory at best, and we often fail to appreciate the deep reactions children have to experiences and threats, to any of which their aggressive conduct is a natural expression of anxiety. A little time spent in getting acquainted often saves later delay and pain and may prevent the development of antagonisms to physicians exhibited by many adolescent and adult patients. Procedures tend to become routinized in hospitals, because of fear of significant omissions. One can see wisdom in this attitude, but also danger; it is wise to challenge continually all routine procedures and examinations and the ways they are carried out, to insure that they are performed, not for their own sake, but really to help the patient and to advance our knowledge of disease.

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27. Levy, D. M.: Psychic Trauma of Operations in Children, Am. J. Dis. Child. **69**:7 (Jan.) 1945.

To what extent and at what age children are apprehensive of death, I do not know. David Brainerd,[28] who was born in 1718, wrote:

> I was from my youth somewhat sober, and inclined to melancholy; but do not remember anything of my conviction of sin, worthy of remark, till I was, I believe, about seven or eight years of age. Then I became concerned for my soul, and terrified at the thoughts of death.

A girl of Puritan birth wrote in later life that at 6 or 7 years of age she was "tempted to commit suicide, but the thought that she would immediately drop into hell deterred her."

In his classic discussion of the Salem witchcraft tragedy, Caulfield[29] wrote of a girl aged 7 who said she was not "afraid" to die and of a girl aged 13 who "was afraid she should go to Hell."

Judging from my own experiences, the child who is to die is usually so ill that toxemia and sedation probably make the patient oblivious of impending dissolution. No doubt fear of death reveals itself more frequently in certain emotional disturbances in puberty or adolescence, such as those I have cited from the writings of Puritan fathers. More observations on this point are needed.[30] Certainly, when death is approaching, the least one can do is to provide the privacy of a single room for patient and parents; the latter will usually appreciate not only comforting words but also simple interpretations of the nature and course of the illness.

CONCLUSION

The founder of St. Bartholomew's Hospital, the monk Rahere, in choosing a staff followed a rule which expresses the spirit of what I have been trying to put before you; his ideals for hospital personnel, on whose quality and conduct the essential nature of an institution fundamentally depends, are as valid in spirit today as in 1123. In conclusion, I quote his quaint words[31] which might serve as a hippocratic motto, so to speak, for each person who participates in any way in hospital work:

> He ought to be gentle, good-tempered, kind, compassionate to the sick and willing to gratify their needs with affectionate sympathy. Further, he ought to have a servant fit for his place, who is to stay continuously in the infirmary and wait upon the sick with diligence and care in all gentleness. He is to get their food ready at the proper time, show their water to the physician, and take a

28. Brainerd, D., cited by Fleming, S.: Children and Puritanism, New Haven, Conn., Yale University Press, 1933, p. 157.

29. Caulfield, E.: Pediatric Aspects of the Salem Witchcraft Tragedy, Am. J. Dis. Child. **65**:788 (May) 1943.

30. Anthony, S.: The Child's Discovery of Death: A Study in Child Psychology, New York, Harcourt, Brace and Company, Inc., 1940.

31. Bachmeyer and Hartman.[1b] Power, D'A.: A Short History of St. Bartholomew's Hospital, London, printed for the hospital, 1923.

careful note of how they ought to diet themselves. The master of the infirmary ought to have Mass celebrated daily for the sick, either by himself, or some other person, should they in any wise be able to come into chapel; but if not he ought to take his stole and missal and reverently at their bedsides make the memorials of the day of the Holy Spirit and of Our Lady, and he ought to repeat to them words of consolation, of patience, and of hope in God; read to them for their consolation the lives of the saints; conceal from them all evil rumors, and in no wise disturb them when they are resting. The master ought frequently to take note of their condition; ask them with kindly interest whether they wish for anything, and bestow on them all the consolation and good feeling in his power. Further, in a spirit of fraternal sympathy he should provide a fire on the hearth should the state of the weather require it, a candle, a cresset and a lamp to burn all night, and everything that is necessary, useful, and proper.

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OCCURRENCE OF COMPLICATIONS IN SCARLET FEVER TREATED WITH PENICILLIN, ANTITOXIN AND GAMMA GLOBULIN

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PREVIOUS experience in 1944-1945 with gamma globulin as a therapeutice agent in scarlet fever indicated that this product of human blood was useful in combating the acute phase of the disease and in preventing early and late complications. It was felt, however, that further, more carefully controlled, studies on the comparative value of gamma globulin, scarlet fever streptococcus antitoxin U. S. P. and penicillin should be made. This paper represents the results of such a study at the Willard Parker Hospital during 1945 and 1946 on 245 patients with scarlet fever. Of these patients, the illness of 93 was graded as mild, that of 127 as moderate and that of 18 as severe (table 1). No patient who did not have a culture of material from the throat yielding hemolytic (beta) streptococci was included in the study. Only 18 per cent of the throat cultures of the patients treated with gamma globulin had become negative for the organism on discharge, as compared with 46 per cent in the group treated with penicillin and 65 per cent in the group treated with antitoxin. These figures indicate that if gamma globulin is effective its *modus operandi* is not bactericidal.

On their admission to the hospital the subjects included in the study were treated strictly in rotation. Any patient already having a complication was not selected. Those receiving gamma globulin were given 60 cc. intramuscularly soon after arrival in the ward. Those receiving penicillin were given that antibiotic in amounts of 15,000 units on admission and then 15,000 units intramuscularly every three hours for ten days. Members of the third group received 9,000 units of scarlet fever streptococcus antitoxin U. S. P. soon after their admission. Each of these patients was then studied during convalescence. A group conference was held on each patient, and the effects of the respective drugs on relief of symptoms and signs were evaluated and charted. The effects on development of early and late complications were studied. The follow-up observation on these patients lasted three months. For all subjects in whom late com-

TABLE 1.—*Results of Bacteriologic Studies on 245 Patients with Scarlet Fever*

	Sex		Race		Severity of Disease			No. of Nose Cultures Positive for Hemolytic Streptococcus	No. of Patients for Whom Discharge Cultures Were Not Made	No. of Throat Cultures Showing Hemolytic Streptococci at Discharge
	Male	Female	White	Negro	Mild	Moderate	Severe			
			Gamma Globulin							
No. of patients	41	41	66	16	33	45	3	27	12	67
% of patients	50	50	80	20	41	55	4	32	15	82
			Penicillin							
No. of patients	44	42	63	23	36	41	5	27	23	47
% of patients	51	49	73	27	44	50	6	31	26	54
			Scarlet Fever Streptococcus Antitoxin							
No. of patients	46	31	68	9	24	41	10	31	38	27
% of patients	60	40	88	12	32	54	14	40	50	35

plications, nephritis and rheumatic fever were suspected, an electrocardiogram was taken, the sedimentation rate was determined and urinalyses and blood pressure tests were made. Late complications were arbitrarily judged as those appearing after the fourteenth day of hospitalization.

The percentage of cultures of material from the nose yielding hemolytic streptococci in the groups receiving globulin, penicillin and antitoxin was 32, 31 and 40 per cent, in that order. It was noted that the highest percentage of throat cultures showing hemolytic streptococci at discharge in the group treated with gamma globulin was 82 per cent, in the group treated with penicillin 54 per cent and in the group receiving antitoxin 35 per cent, thus suggesting the ineffectiveness of gamma globulin in clearing the throat of hemolytic streptococci. It should be noted, however, that throat cultures were not reported for all patients. For approximately 70 per cent of the total number of patients the routine sedimentation rate was determined at least once.

TABLE 2.—*Complications in Patients Treated for Scarlet Fever*

Prior to Fourteenth Day in Hospital		After Fourteenth Day in Hospital	
Gamma globulin		Day	
Total: 2%		16	Secondary rise in temperature (moderate) with cervical adenitis
Penicillin		15	Paronychia (moderate)
Day			
12	Cervical adenitis (mild)	19	Lobar pneumonia (mild)
5	Infectious arthritis (severe)	19	Cervical adenitis (bilateral) with tonsillitis (moderate)
2	Acute purulent otitis media (left ear, moderate)	19	Acute catarrhal otitis media (moderate)
	Total 7%	18	Acute purulent otitis media (right, mild)
Scarlet Fever Streptococcus Antitoxin U.S.P.			
10	Acute rheumatic fever myocarditis (moderate)		
4	Cervical adenitis (moderate)		
5	Cervical adenitis (moderate)		
2	Cervical adenitis (severe)		
3	Acute catarrhal otitis media (bilateral, severe)		
9	Acute purulent otitis media (mild)		
6	Acute purulent otitis media (moderate)		
	Total 10.3%		

In the group treated with gamma globulin there were no complications prior to the fourteenth day in the hospital. On the fifteenth day 1 patient had a suppurative complication—cervical adenitis with secondary rise in temperature.

In the group receiving penicillin 3 patients had complications prior to the fourteenth day—the first, acute purulent otitis media (left side) on the second day; the second, infectious arthritis on the fifth day, and the third, cervical adenitis on the twelfth day. Complications also developed in this group after the fourteenth day in 3 patients, all on the nineteenth day——lobar pneumonia, tonsillitis with bilateral cervical adenitis and acute purulent otitis media (left side), respectively.

The last group, patients treated with scarlet fever antitoxin, showed the largest number of complications prior to the fourteenth day in the hospital. Seven patients had complications. Of these 7 children, 3 had cervical adenitis, appearing on the second, fourth and fifth day, respectively; 2 had acute purulent otitis media, occurring in 1 on the sixth and in the other on the ninth day, and 1 had acute catarrhal otitis media (bilateral) on the third day. One patient had acute rheumatic fever on the tenth day. In the same group, however, only 1 patient had a complication after the fourteenth day—acute purulent otitis media (right side) on the eighteenth day.

It was interesting to note that in the patients receiving scarlet fever antitoxin the temperature fell dramatically, but a large number of them revealed a secondary rise to 101 and 102 F. and over on the third day after the administration of antitoxin. In the patients treated with gamma gloublin, also, a most remarkable response in a feeling of well-being was noted in twenty four hours.

SUMMARY

Two hundred and forty-five patients with scarlet fever at Willard Parker Hospital were treated strictly in rotation with penicillin, gamma globulin and scarlet fever streptococcus antitoxin U. S. P.

There were three and one half times as many complications in the group treated with penicillin as in that receiving gamma globulin and five times as many complications in the group treated with antitoxin as in that receiving gamma globulin. However, it should be noted that there were over twice as many severely ill patients in the group treated with antitoxin as in that receiving penicillin and over three times as many as in the group receiving gamma globulin. On the other hand, in the patients in whom complications actually developed there was no indication of any relation to the severity of the disease.

The ineffectiveness of gamma globulin in clearing the throat of hemolytic streptococci as compared with the good results obtained with penicillin and antitoxin was noteworthy.

The considerable percentage of the late febrile reactions following administration of antitoxin corroborates the observations of one of us (J. F. L.).

CONCLUSION

A comparison of the three agents employed in this study, namely, penicillin, scarlet fever streptococcus antitoxin U. S. P. and gamma globulin, indicates that the last-named substance is the most effective in reducing the number of early and late complications in scarlet fever, despite the fact that it is relatively ineffective in clearing the throat of the hemolytic streptococcus as compared with the other two agents. This work tends to confirm the observations of a previous study.

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SALMONELLA DERBY MENINGITIS

Report of a Case of a Two Month Old Infant

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WHEN SALMON and Smith, in 1885, first isolated the organism they considered the causative agent of hog cholera, salmonellosis was regarded primarily as a disease of the gastrointestinal tract. Since then, considerable evidence has been accumulated indicating that there are other, equally important, clinical manifestations of this disease, and now, with better bacteriologic facilities available, salmonella infections are increasingly recognizable.

The case of Salmonella derby meningitis with recovery in a 2 month old infant is reported. The literature records only 1 case of this condition, and that with a fatal outcome. Moreover, we have found no reference to salmonella meningitis of any type with recovery in a patient under the age of 15 months.

REPORT OF CASE

L. M., a 2 month old Negro girl, was admitted to the Harlem Hospital on Aug. 29, 1946. Two days prior to the patient's admission the mother observed that the infant had "a slight cold," the symptoms of which persisted and became progressively worse. Because the infant became "drowsy and feverish," she was brought to the hospital.

The infant, the first child of a 22 year old mother, had been delivered spontaneously at full term. The past medical and family histories were noncontributory. The infant's diet consisted of an evaporated milk—boiled water—"karo" syrup formula, orange juice and the usual vitamin supplements.

Physical examination revealed an acutely ill, pale, listless, apathetic infant, whose temperature was 102.6 F. Dulness, diminished breath sound and dry, crackling rales were noted over the area of the upper lobe of the left lung. The rest of the examination revealed nothing abnormal, and no signs of meningeal irritation were observed. A preliminary diagnosis of pneumonia in the upper lobe of the left lung was made, and roentgenographic examination revealed increased density in this area.

From the Pediatric Service, Harlem Hospital, Dr. Morris Gleich, Director.

The infant was given 25,000 units of penicillin at once and 10,000 units intramuscularly every three hours, as well as 0.6 Gm. of sulfadiazine at once and 0.2 Gm. every four hours. Despite this therapy for forty-eight hours, the condition grew progressively worse. Her temperature had risen to 105.8 F.; questionable nuchal resistance and a somewhat tense anterior fontanel were noted. Lumbar puncture yielded a turbid spinal fluid. The next day, September 1, the infant became severely dyspneic, and a fine, generalized macular rash was observed. She appeared moribund. Her mouth and throat filled with a thick, tenacious sputum, which was aspirated repeatedly. Oxygen and respiratory stimulants were used.

The spinal fluid was centrifuged, and the sediment revealed numerous motile bacilli, a smear of which showed gram-negative rods. The sediment was cultured on MacConkey's medium. After eighteen hours, non-lactose-fermenting colonies were present, which were subcultured on triple sugar-iron agar (Hajna,[1] Neter[2]). The growths on this medium after eighteen hours were culturally typical of Salmonella. The organism was further cultured in sorbitol, tryptone and urea test mediums (Stuart and associates[3]). Sorbitol was fermented, with production of acid and gas; no indole was produced, and there was no urease activity. The organism also agglutinated with polyvalent serum against the salmonella group and with serum for the B group. Finally, a specimen of the culture was sent to Dr. Erich Seligmann, New York Salmonella Center, and the organism was identified as S. derby with the antigenic formula IV. XII; fg.

Chemical studies of the spinal fluid revealed 23 mg. of sugar, 35 mg. of total protein and 720 mg. of chlorides, per hundred cubic centimeters. Culture of blood taken on the second day after the patient's admission yielded a growth of S. derby by the bacteriologic methods described in the preceding paragraph. Cultures of the urine and stool did not yield the organism and serial blood agglutination tests were also reported to give negative results. The hemogram was as follows: hemoglobin, 44 per cent; red cells, 2,250,000, and white cells, 19,600, with a shift of the granular series to the left.

The infant's general condition began to improve on the following day, September 2, at which time the rash disappeared, although the temperature continued to remain elevated until the seventh day of hospitalization, September 5. A transfusion of 50 cc. of whole blood was given intratibially on September 2 and repeated at three day intervals until the hemogram was essentially normal.

For the next eighteen days the patient remained afebrile and showed steady clinical improvement. Examinations of the spinal fluid were made every third day; cultures of the fluid were sterile, and values for the chemical constituents remained normal. On the twenty-first day in the hospital, September 18, all medication was discontinued.

On the twenty-fifth day, September 23, clinical signs of meningitis reappeared, and the temperature rose to 103 F. Convulsive seizures were seen. The cerebrospinal fluid and blood again showed the presence of S. derby on culture. Twenty-five thousand units of penicillin was injected intrathecally and 10,000

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1. Hajna, A. A.: Triple-Sugar Iron Agar Medium for Identification of Intestinal Group of Bacteria, J. Bact. **49**:516, 1945.

2. Neter, E.: Microbiologic Aspects of Salmonellosis in Chlidren, New York State J. Med. **48**:412, 1948.

3. Stuart, C. A.; Van Stratum, E., and Rustigan, R.: Further Studies on Urease Production by Proteus and Related Organisms, J. Bact. **49**:437, 1945.

units intramuscularly every three hours. In addition, 72 cc. of a 2.5 per cent solution of sodium sulfadiazine was injected subcutaneously and 60 cc of whole blood was given intratibially. Determination of sulfadiazine levels of the blood and spinal fluid showed adequate concentrations within twenty-four hours (blood level 19.3 mg., and spinal fluid level 22.7 mg., per hundred cubic centimeters). The infant became afebrile in forty-eight hours, at which time the blood and spinal fluid cultures were reported sterile.

We were unable to obtain streptomycin until the thirty-third day in the hospital, October 1. Subsequently, administration of sulfadiazine and penicillin was discontinued, and streptomycin was used intrathecally and intramuscularly for fourteen days, a total of 5 Gm. being given. The course of the illness thereafter was uneventful.

It is of interest that no specific agglutinins were detected in the infant's blood serum at any time throughout the illness. A thorough physical examination eleven months later showed no residual signs. The infant had apparently made a complete recovery and was in good health.

COMMENT

Salmonella infections occur in all parts of the world, regardless of climate, and with no apparent predilection for sex, age or race. There is, however, a definite seasonal variation in the incidence of the disease, the low point occurring in the winter, with a gradual increase beginning in April and reaching a peak by October.

Salmonellosis occurs sporadically or in epidemic proportions. It may spread in numerous ways, the commonest agents being infected animal meats, milk or related products, symptom-free carriers, insect vectors, rats and mice. It is important to remember that the infected foods are not altered in appearance or taste.

Sachs and Antine,[4] in 1944, stated that the clinical manifestations of salmonellosis could be divided into three types: gastroenteric, salmonella fever and septicopyemia. The gastroenteric type is usually characterized by a short incubation period and the usual signs of gastroenteritis; Salmonella typhimurium is the common offender. The salmonella fever type runs the course of atypical typhoid, with general sepsis, rash and a sustained hyperpyrexia. The diagnosis is made on the basis of isolation of the organism from the blood and the presence of specific blood serum agglutinins. The septicopyemic type is characterized by protean manifestations, which are always severe. There is an extremely high mortality for this type. The diagnosis is made by recovering the organisms from the blood and the infected focus.

Salmonella meningitis is classified under the septicopyemic type. It should be noted that stool cultures always yield the organism in cases of

4. Sachs, J., and Antine, W.: Salmonella Infection in Man: Report of Five Cases with Autopsies in Two Cases and Review of Clinical Aspects, Am. J. M. Sc. **208**:633, 1944.

the gastroenteric type and rarely so in cases of the other two types. Specific blood serum agglutinins are always present with salmonella fever type and seldom so with the other two types.

In 1943, Seligmann and associates[5] reported 1,000 cases of salmonella infection in man and classified them accordingly to White and Kauffmann. According to this classification, which is based on the high agglutination properties of the organism, S. derby is a member of group B, along with S. typhimurium, the most commonly encountered group in the United States.

Seligmann's 1,000 cases included 27 of the S. derby type, and only 1 of these was of meningitis; furthermore, in this case the outcome was fatal. He reported a total of 23 cases of salmonella meningitis of all types. Nineteen of the patients died, and not an infant under the age of 15 months survived.

As with other meningitides in very young infants, we were faced with the difficulty of early diagnosis of this disease. Suggestive evidence of meningitis appeared only after forty-eight hours of hospitalization. The organism recovered from the blood and the spinal fluid was identified by the staff of our own laboratory as a gram-negative rod of the salmonella group, but it was only after recourse to the New York Salmonella Center that the organism was identified as S. derby. Careful examinations of the patient's home and parents failed to disclose the source of the infecting organism.

Because streptomycin was not available to us until the thirty-third day of hospitalization, we proceeded with the treatment of choice—sulfadiazine therapy. Penicillin therapy was used on an empiric and prophylactic basis. High and Spaulding,[6] in August 1946, reported the use of sulfadiazine in Salmonella panama infections, with good results. It is interesting to note that the infant was asymptomatic for twelve days while under treatment with sulfadiazine alone but relapsed within five days after the sulfadiazine was discontinued. A latent focus of infection was probably present, which precipitated the relapse. This supposition is further borne out by the fact that when sulfadiazine and penicillin therapy was reinstituted the patient became asymptomatic in forty-eight hours.

Keefer[7] reported 22 cases of salmonella infections (no meningitides) in which streptomycin was used, with a high fatality rate. He advocated

5. Seligmann, E.; Saphra, I., and Wassermann, M.: Salmonella Infections in Man, Am. J. Hyg. **38**:266, 1943.

6. High, R. H., and Spaulding, E. H.: Human Infection with Salmonella Panama, Am. J. Dis. Child. **72**:181 (Aug.) 1946.

7. Keefer, C. S.: Streptomycin in the Treatment of Infections, J. A. M. A. **132**:4 (Sept. 7) 1946; Streptomycin in the Treatment of Infections, ibid. **132**:70 (Sept. 14) 1946.

early and large doses of streptomycin for a two week period but warned that many strains of salmonella vary greatly in their susceptibility, accounting for his admittedly poor results. The dose of streptomycin used in our case was commensurate with the age and weight of the patient. However, we are unable to evaluate the therapeutic effect obtained because the patient was already asymptomatic with sulfadiazine therapy.

It is our opinion that the best available therapy for salmonella infections is a combination of sulfadiazine and streptomycin.

SUMMARY

A case of S. derby meningitis with recovery in a 2 month old infant is reported. The patient was treated with sulfadiazine and penicillin, with good results, only to relapse after medication was discontinued. Recovery was complete, with no sequelae, after a second course of sulfadiazine, penicillin and, finally, streptomycin.

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TOE REFLEXES IN INFANCY AND THE DEVELOPMENT OF VOLUNTARY CONTROL

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AMONG the most interesting reflexes in infancy are those which disappear after a few weeks or months of life: the hand grasp, Babinski, Moro embrace and tonic neck reflexes.

Inasmuch as the hand grasp reflex of the newborn infant disappears by the time the child has attained enough voluntary control to reach out for objects, we became interested in whether the toe grasp reflex disappears when the child attains voluntary control over his feet and legs. If this reflex is comparable to that of the hand grasp, we felt that it should begin to disappear at the time when the child starts to crawl.

PURPOSE

We wished to determine whether the developmental stage was more significant than the chronologic age in the incidence of three reflexes: toe grasp reflex, pressure foot reflex and plantar reflex. Since attainment of voluntary control is related to increase in developmental age, and since voluntary control takes the place of certain types of reflex behavior, we considered that when we had studied data concerning these factors we could contribute to the understanding of the relation between the development of voluntary control and the disappearance of this reflex activity. In order to do this we selected the aforementioned reflexes for study and noted the developmental stage and the chronologic age of the infant.

MATERIAL AND METHOD

The stages of development used in this study were those followed in the well baby clinics in Rochester, Minn. The average age placement and the description of these stages were presented by Aldrich and Norval.[1]

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The Rochester Child Health Institute is supported by grants-in-aid from the Mayo Association, United States Public Health Service, Mead Johnson and Company and the Schlitz Foundation.

1. Aldrich, C. A., and Norval, M. A.: A Developmental Graph for the First Year of Life, J. Pediat. **29**:304-308, 1946.

The subjects were 70 healthy children 3 weeks to 16 months of age who were examined in well baby clinics. We are aware that this group of subjects is not large and that percentages for a group of this size are not so significant as those for a larger group; however, we thought it worth while to report our observations, and the use of percentages seemed the most convenient means.

First, the child was placed in a position in which he was apparently contented. In the majority of instances this was the supine position. However, older infants, particularly those more than 8 months of age, often preferred to sit up. Since change in position might cause variation in results, in preliminary work the response when the child was in each position was noted, and a difference was not apparent.

Second, the observer lightly restrained the infant's leg when it was in constant motion and then waited for tolerance of this restraint before beginning the test. Usually, infants less than 6 months of age who are awake and in the supine position move their legs or feet constantly. Their legs alternately flex and extend at the hip, knee and ankle, and with these movements the toes flex and extend also. It was necessary to bring about cessation of movement in order to observe the response to the stimulus. Babies did not resist light restraint as a rule. However, children of about 1 year of age often were in the touch-me-not stage of life and cried when the observer approached. When the child could not be appeased, he was not included in the study.

I. THE TOE GRASP REFLEX

The toe reflex is similar to the hand grasp reflex. The two reflexes are present at birth, and after a period of months they disappear. Gesell and Amatruda[2] and Sittig[3] stated that the automatic hand grasp is replaced by a voluntary grasp when the child reaches out for objects at the age of approximately 4 to 5 months. We wished to contribute our observations to the determination of whether the toe grasp reflex also is replaced by voluntary movement of the feet and legs.

Interest in the phenomenon of the toe grasp has not been so great as in that of the hand grasp, probably because in our culture toes are not ordinarily used for voluntary grasping. Moreover, since Babinski's[4] description of the behavior of the extensor plantar reflex in 1896, extensor and flexor responses of the toes to a moving stimulus on the plantar surface have seemed to monopolize interest in reflexes of the foot. However, after the stage of infancy, so-called forced grasping of both the toes and the hands, as well as the Babinski reflex, occurs in pathologic conditions of the nervous system.

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2. Gesell, A., and Amatruda, C. S.: Developmental Diagnosis: Normal and Abnormal Child Development; Clinical Methods and Practical Applications, New York, Paul B. Hoeber, Inc., 1941, p. 32.

3. Sittig, O.: Ueber die Greifreflexe im Kindesalter, Med. Klin. **28**:934-936, 1932.

4. Babinski, M. J.: Sur le réflexe cutané plantaire dans certaines affections organiques du système nerveux central, Compt, rend. Soc. de biol. **48**:207-208, 1896.

Method.—A knitting needle was used to elicit the toe grasp reflex because it was found to be the right size for actual grasping by the toes. The needle was laid parallel with the metatarsal arch, between the ball of the toes and the ball of the foot, without the exertion of pressure.

A total of 160 observations was made. In a preliminary study it was seen that a sudden change in type of response occurred after the child was 5 months old; therefore, it was considered that fewer subjects less than 4 months of age were needed.

TABLE 1—*Influence of Age and Development on the Toe Grasp Reflex*

Developmental Stages	Age, Mo.										Total No. of Infants	Reflex Present, Per Cent
	¾ to 5		6 to 7		8 to 9		10 to 11		12 or more			
	No. of Infants	Reflex Present, Per Cent*	No. of Infants	Reflex Present, Per Cent	No. of Infants	Reflex Present, Per Cent	No. of Infants	Reflex Present, Per Cent	No. of Infants	Reflex Present, Per Cent		
No smile—smile	1	100	—	—	—	—	—	—	—	—	1	100
Vocal (coo)—head control	9	100	—	—	—	—	—	—	—	—	9	100
Hand control—roll†	18	100	2	100	—	—	—	—	—	—	20	100
Sit alone—crawl	5	100	23	95.6	13	92.3	2	50	—	—	43	93
Pull to stand—walk with support	—	—	8	75	21	52.4	16	25	8	12.5	53	41.5
Stand alone—walk alone	—	—	—	—	4	0	7	14.3‡	19	0	30	3.3
Run	—	—	—	—	—	—	—	—	4	0	4	0
Total no. of infants	33	—	33	—	38	—	25	—	31	—	160	—
Reflex present, per cent§	—	100	—	90.9	—	60.5	—	24	—	3.2	—	58.1

*Of babies in each developmental stage in which the reflex was present.
†The child is able to roll from back to abdomen.
‡One child could stand alone, but could not walk.
§Percentage of infants in each chronologic age group in whom the reflex was present.

Responses were considered to be present, transitional or absent. When the response was present, immediate automatic grasping of the needle occurred. A transitional response was characterized by slight flexing of the toes or by a slightly delayed, but rapid, flexor response. Our observations led us to believe that these responses represented a transitional stage before the reflex was actually lost. If the toes failed to flex or if flexion was slow and apparently voluntary, we considered that the reflex was absent. Only when the response was present were the results included in the tables, which follow.

Results.—First, table 1 shows the influence of age and development on the toe grasp reflex. Inasmuch as all children less than 6 months of age exhibited the reflex these were recorded together in one age group.

Only 1 child more than 12 months of age retained the reflex, so children who were more than 12 months old were also placed in one group.

All children up through the developmental stage called "roll" (the child is able to roll from back to abdomen) exhibited the toe grasp reflex, regardless of age. It was during the following stages, in which the child was able to sit alone and to crawl, that absence of the reflex was noted. The percentage of infants in the next three stages (the child could pull himself up to stand, walk with support and stand alone) who did not have the reflex was greatly increased, and at the stage in which the child could walk alone, the reflex was gone, although a few transitional responses occurred. The developmental stage in which the feet are first used for locomotion is that of crawling. We considered use of the feet for locomotion as early evidence of their voluntary control. This interpretation is similar to that of McGraw.[5]

The greater significance of development as compared with age in the disappearance of the reflex was suggested in two ways. First, the reflex was present in 100 per cent of the babies until they first used their feet for locomotion. The reflex disappeared by the time the babies walked alone. The loss occurred during the intervening stages, while voluntary control of their feet was developing.

Second, table 1 shows that in the two month period when the children were 8 and 9 months of age, in which the greatest loss of the reflex occurred, 92.3 per cent of the babies who could sit alone and crawl exhibited the toe grasp reflex. In approximately one half (52.4 per cent) of the infants of the same age in the next two stages of development (the child could pull himself up to stand and could walk with support) the reflex was still present. None of the babies of that age who could stand alone or walk alone exhibited the reflex. This shows the striking decrease in the percentage of children in the same age group, but in different developmental stages, who made a reflex response when the stimulus was applied. This decrease is in contrast to the slower and only partial decrease during the developmental stages in which the child could pull himself up to stand and walk with support, the stages in which the greatest decrease occurred. The percentage of babies with the reflex fell from 75 at 6 and 7 months of age to 25 at 10 and 11 months. The fact that the number of babies who exhibited the reflex decreased with increasing age within this horizontal column, even though all the children attained the developmental stage being studied, may indicate that other aspects of neural maturity enter into this problem.

Since the difference between the average ages of the infants who could sit alone and of those who could walk alone is about six months

5. McGraw, M. B.: The Neuromuscular Maturation of the Human Infant, New York, Columbia University Press, 1943.

and since the time interval of the developmental stage being considered is also six months, it is fair to compare the data in these two columns of table 1.

The two curves of figure 1 are plottings for the data in the extreme right column and in the bottom column of table 1. The slopes of the two curves do not differ significantly because when data are given for the entire group the separation of the two factors, age and development, is hidden to some extent. Also, similarity results because of the concurrence of the two factors. However, the decrease in the number of babies who exhibited the reflex occurred only during the stages in which voluntary control of the feet develops.

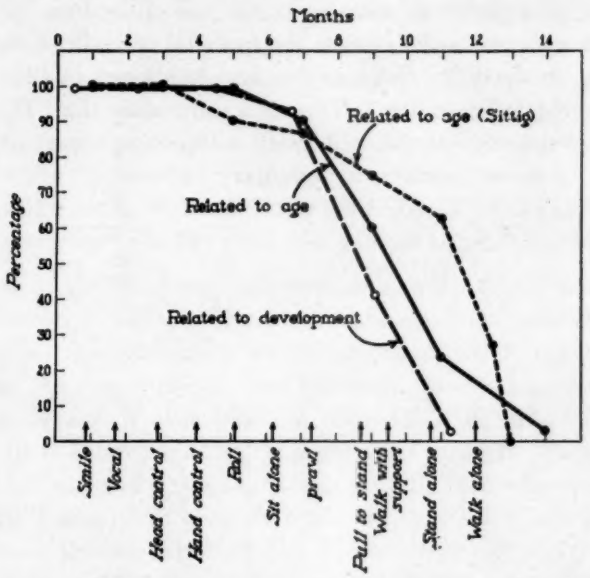

Fig. 1.—Relation of disappearance of the toe grasp reflex to age and development.

The data given on the base line of figure 1 are placed at age points which were ascertained as average among babies in this community by Aldrich and Norval. For instance, 4 months was the average age at which a group of babies attained hand control (the child began to reach out for objects). Inasmuch as the toe grasp reflex was elicited in 100 per cent of the babies in our series who possessed both hand control and the ability to roll over, we plotted this point halfway between the age values for those two developments. Figure 1 indicates in a graphic way that the incidence of the toe grasp reflex changes most definitely at the stages in which the child pulls himself up to stand and walks with support. The reflex was elicited in only 1 infant who was past the age of 11 months, and this child, who was 14 months old, had just attained the ability to walk with support.

Comment.—When we compared our results with those of the authors of the two other papers on this subject, we found that ours were similar to those of Sittig[5] (fig. 1) but not to those of Brain and Curran.[6] Brain and Curran mentioned Sittig's results, but they did not comment on the discrepancies between their results and his. Perhaps the discrepancies occurred because different methods of obtaining the reflex were used.

Our method was almost identical with one of Sittig's, and all his methods are similar to one another. Brain and Curran used three methods which differ greatly from one another. Only one of them was similar to ours. The three methods of Sittig were: (1) applying the index finger or a glass rod crosswise on the ball of the toes, (2) applying either of these between the base of the toes and the ball of the foot and (3) placing the tip of the finger in the same location as in (2). Sittig did not observe the reflex in any infants who were more than 12 months of age. He concluded that the foot grasp reflex disappears with the development of more complex or voluntary movements when the child stands and walks. Sittig called the reflex the "foot grasp reflex." We believe it to be the same as the one which we call the "toe grasp reflex."

Brain and Curran stated that the toe grasp reflex can be obtained by the following methods: (1) application of light pressure on the plantar surface of the distal part of the foot including the toes, (2) a light stroking movement from the heel forward and (3) grasp of a thin pencil by the toes. They do not state how they applied the light pressure or the stroke. They implied that the results with the three methods were identical. This was not confirmed by us in the study preparatory to the present one, in which we used Brain and Curran's three methods. When the third method was used the greatest number of toe flexion responses occurred, and when the second was used the smallest number occurred. In the course of this preliminary study we discovered that when moderate pressure was applied on the ball of the foot the results were similar to those obtained with the use of the knitting needle. It is our opinion that this reflex is different from that elicited when Brain and Curran's first method was used.

Although Brain and Curran implied that the results with their three methods were identical, in their discussion of cases of pathologic conditions of the nervous system they indicated clearly that sometimes one and sometimes another of these stimuli elicited forced grasping when the others failed. Hence, it seems that there may be several toe flexion reflexes.

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6. Brain, W. R., and Curran, R. D.: The Grasp-Reflex of the Foot, Brain **55**:347-356, 1932.

In their study Brain and Curran observed the toe grasp reflexes of 50 children who did not have disease of the nervous system. The reflex was present in all of the 24 children who were less than 9 months old, in 2 of 4 children between the ages of 9 and 12 months and in 5 of 9 children between the ages of 1 and 2 years. The other 13 children were more than 2 years of age.

II. THE PRESSURE FOOT REFLEX

Method.—When the observer applied moderate pressure with the tip of the index finger on the ball of the infant's foot just below the middle toe, an automatic plantar flexor response of all the toes occurred early in infancy and was absent later. Responses were observed to be present, transitional or absent. The transitional responses were of the same character as those for the toe grasp reflex.

TABLE 2—*Influence of Age and Development on the Pressure Foot Reflex*

Developmental Stages	Age, Mo.										Total No. of Infants	Reflex Present, Per Cent
	¾ to 5		6 to 7		8 to 9		10 to 11		12 or more			
	No. of Infants	Reflex Present, Per Cent	No. of Infants	Reflex Present, Per Cent	No. of Infants	Reflex Present, Per Cent	No. of Infants	Reflex Present, Per Cent	No. of Infants	Reflex Present, Per Cent		
No smile—smile	4	100	—	—	—	—	—	—	—	—	4	100
Vocal (coo)—head contral	20	100	—	—	—	—	—	—	—	—	20	100
Hand control—roll	28	100	3	100	3	66.6	—	—	—	—	34	97
Sit alone—crawl	4	100	25	80	15	80	1	0	—	—	45	80
Pull to stand—walk with support	—	—	10	80	26	38.5	21	19.0	10	0	67	32.8
Stand alone—walk alone	—	—	2	0	4	0	7	0	25	0	38	0
Run	—	—	—	—	—	—	—	—	4	0	4	0
Total no. of infants	56	—	40	—	48	—	29	—	39	—	212	—
Reflex present, per cent	—	100	—	77.5	—	50	—	13.8	—	0	—	54.2

Results.—Table 2 is similar to table 1 in that it shows the same striking change with increasing development within the age groups in which loss of the flexor response occurs. In all subjects but 1, the flexor response was elicited through the development stage in which the children could roll; some of them lost it in the next two stages in which they could sit alone and crawl, and all lost it by the time they were able to stand alone, or were 12 months old. Figure 2 is a graphic presentation of some of the data.

Comment.—No paper in which this reflex was described could be found. The possibility was entertained that the reflex elicited by Brain and Curran when they applied light pressure on the plantar surface of the distal part of the foot, including the toes, was the same, but they stated that the foot was not displaced at any joint. The pressure of our stimulus was sufficient, we believe, to produce slight displacement and stretching of the digitorum longus tendons.

Is this the Rossolimo reflex? Brain and Curran stated, "This reflex [Rossolimo] is a contraction of the long flexors of the toes, probably evoked by suddenly displacing them." The Rossolimo reflex is usually obtained by tapping the ball of the toes (Grinker[7]) or the ball of the foot (Brain and Curran).

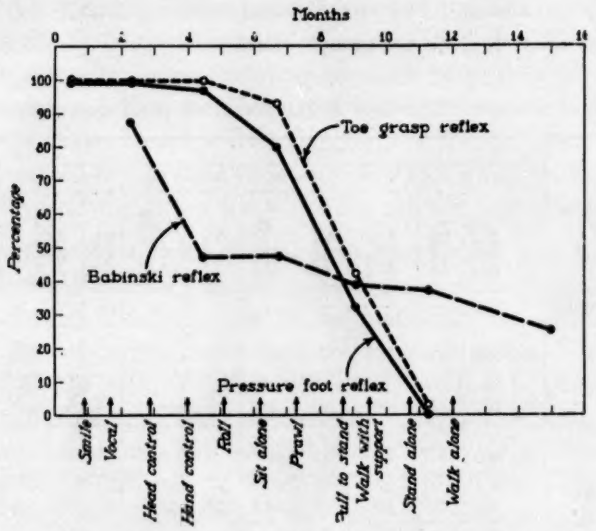

Fig. 2.—Relation of the disappearance of the toe grasp, pressure foot and plantar reflexes to the development of voluntary control of the legs.

The results of our two studies were so similar that the question of whether the two reflexes are the same arose. If light touch with a knitting needle were a lighter stimulus for the same reflex as that obtained by moderate pressure on the ball of the foot, then it would be expected that fewer responses would occur when the lighter pressure was applied. The reverse was true. In 135 (82.8 per cent) of 163 observations, flexion of the toes occurred in response to both stimuli. In 23 children the toe grasp reflex was always present or transitional when the pressure foot reflex was transitional or absent, and in no child was the pressure reflex present when the toe grasp reflex was absent. In our series the pressure

7. Grinker, R. R.: Neurology, ed. 2, Springfield, Ill., Charles C Thomas, Publisher, 1937, p. 145.

foot reflex was absent when a child was able to stand alone, whereas one more developmental stage was reached before the toe grasp reflex disappeared.

III. THE PLANTAR REFLEX

The term "plantar reflex" is employed in the usual sense to describe the response of the toes to a moving stimulus applied to the sole from heel to toe. The term "Babinski reflex" is used to mean the extensor response of the large toe to a moving stimulus applied in the same way.

Method.—The point of a knitting needle was moved once from heel to toe on the lateral side of the plantar surface. As accurately as possible the same pressure was maintained, except when the withdrawal of the leg or foot occurred. In this case additional observations were made, and a progressively lighter pressure was applied in order to elicit movements of the toes only. Reactions of the large toe with and without withdrawal of the foot were noted. Responses were classified as extensor, flexor or absent.

Results.—When it is stated that no response occurred, we do not mean that loss of either the flexor or the extensor reflex occurred, because continued stimulation with the same degree of pressure or with increased pressure often resulted in either an extensor or a flexor response. Information concerning this reaction is often utilized in clinical practice. If the pressure is made strong enough, a withdrawal response which may or may not be associated with toe responses results. Of 25 withdrawal responses, 17 were associated with flexor toe responses and 1 with an extensor response, while in the rest the response was absent.

In the interpretation of the data, one question arises: How should the group in which no response occurred be considered? The percentage of infants who exhibited no response increased as age increased, from 29 per cent in the group from 2 through 5 months of age to 49 per cent in the group from 10 through 13 months of age. Thirty-eight per cent of all responses were of this type, even when more than one stimulation was used. This percentage does not conflict with the results of other observers: Feldman,[8] 50 per cent; Schüler,[9] 50 per cent; Morse,[10] 35 per cent; Burr,[11] 27 per cent for the first ninety days. But the fall in the curve is the same, regardless of whether the absent responses are included or excluded from the total group of responses.

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8. Feldman, W. M.: The Nature of the Plantar Reflex in Early Life and the Causes of Its Variations, Am. J. Dis. Child. **23**:1-40 (Jan.) 1922.

9. Schüler, L., cited by Feldman.[8]

10. Morse, J. L., cited by Feldman.[8]

11. Burr, C. W.: The Reflexes in Early Infancy, Am. J. Dis. Child. **21**:529-533 (June) 1921.

TABLE 3—*Influence of Age and Development on the Babinski Reflex*

Developmental Stages	Age, Mo.																Total	
	¾ to 1		2 to 3		4 to 5		Extensor Reflex Present						12 to 13		14 to 15			
							6 to 7		8 to 9		10 to 11							
	No. of Infants	Per Cent	No. of Infants	Per Cent	No. of Infants	Per Cent	No. of Infants	Per Cent	No. of Infants	Per Cent	No. of Infants	Per Cent	No. of Infants	Per Cent	No. of Infants	Per Cent	No. of Infants	Per Cent
No smile—smile	2	50	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2*	50.0
Vocal (coo)—head control	2	100	4	75	2	100	—	—	—	—	—	—	—	—	—	—	8	87.5
Hand control—roll	—	—	—	—	17	52.9	2	0	—	—	—	—	—	—	—	—	19	47.3
Sit alone—crawl	—	—	—	—	4	75	21	57.1	14	28.6	1	0	—	—	—	—	40	47.5
Pull to stand—walk with support	—	—	—	—	—	—	7	57.1	16	37.5	15	33.3	4	25	4	50	46	39.1
Stand alone—walk alone	—	—	—	—	—	—	—	—	3	66.6	7	28.6	9	22.2	8	50	27	37.0
Run	—	—	—	—	—	—	—	—	—	—	—	—	1	100	3	0	4*	25.0
Total no. of infants	4	—	4	—	23	—	30	—	33	—	23	—	14	—	15	—	146	—
Extensor reflex present, per cent	—	75	—	75	—	60.9	—	53.3	—	36.4	—	30.4	—	28.6	—	40	—	44.5

*Too few responses were elicited to make these figures meaningful.

Table 3 does not show a clearcut influence of increasing development or of increasing age within any column. Flexor responses of the large toe occurred even in the first three months. The totals in the bottom column and the extreme right hand column, however, show a tendency to decrease with increasing chronologic and developmental age. In figure 2 all values, except one from the extreme right column of table 3, have been plotted. The first value in the column (50 per cent) was not plotted as we felt this observation was not significant. It is obvious that the figure does not conform with the other values near it, in terms of either development or age. For instance, of the 10 babies from 3 weeks to 5 months of age in the stages from that in which the child did not smile through that in which he began to control motion of the head 8 (80 per cent) had the extensor toe reflex. The curve falls slowly throughout the age range studied. Six of the 15 children who were 14 or 15 months old continued to have the Babinski reflex. In our study the disappearance of the extensor response was not related directly to the acquisition of voluntary control of the feet and legs.

Comment.—The great variability in results of studies of the plantar reflex is probably due to the fact that so many factors enter into its elicitation. Manner of stimulation and parts to be stimulated and observed for response all influence the results. The majority of workers agree that among normal children (1) the Babinski reflex may be elicited in a considerable percentage well into the second year of life and (2) the incidence of extensor responses decreases and that of flexor responses increases with increasing age. Many authors state that these changes have little relation to walking because numerous children have the flexor response when they are not yet able to walk, and, at the same time, many have the extensor response when they are able to walk (Feldman,[8] Waggoner and Ferguson,[12] Wolff[13] and Collier[14]). McGraw[5] stated that the segmental plantar reflex can first be elicited at the time of "deliberate walking."

COMPARISON OF THE PLANTAR AND THE TOE GRASP REFLEXES

If the toe grasp reflex (or the pressure foot reflex) is compared with the Babinski reflex, it is noted that in the group of infants who do not exhibit the toe grasp reflex one third still have the Babinski reflex, whereas

12. Waggoner, R. W., and Ferguson, W. G.: Development of Plantar Reflex in Children, Arch. Neurol. & Psychiat. **23**:619-633 (April) 1930.

13. Wolff, L. V.: The Response to Plantar Stimulation in Infancy, Am. J. Dis. Child. **39**:1176-1185 (June) 1930.

14. Collier, J.: An Investigation upon the Plantar Reflex, with Reference to the Significance of Its Variations Under Pathological Conditions, Including an Enquiry into the Aetiology of Acquired Pes Cavus, Brain **22**:71-99, 1899.

of those who do exhibit the toe grasp reflex one sixth have the flexor response of the large toe. Hence, the flexor response of the large toe is present at an earlier age in some babies and disappears at a much later age in others when it is compared with the toe grasp reflex (fig. 2). Therefore, its disappearance is not associated with acquisition of the same behavior.

In figure 2 data concerning the three reflexes are presented graphically. The only paper we found in which these reflexes are compared was that of Brain and Curran. They stated that the toe grasp reflex persists longer than the Babinski reflex. Our data do not confirm this statement.

SIGNIFICANCE OF THE FOOT REFLEXES IN INFANCY

The presence of these reflexes in infancy is undoubtedly evidence of immaturity of the nervous system. Like other reactions, such as the Moro reflex, the tonic neck reflex, the Thomson lip reflex and the hand grasp reflex, these reflexes of the foot disappear with increasing age as a result of maturation of the nervous system. It is of significance that when cortical control of behavior occurs some of these early reflexes disappear.

The toe grasp reflex and the pressure foot reflex are easy to elicit and apparently their elicitation is not subject to the many influences that affect the plantar flexor reflex. Moreover, they are present a relatively short time in the life span. Is it possible that signs such as the toe grasp reflex can be used by physicians as clinical evidence of normal or delayed development?

If it is true that increasing cortical control leads to the disappearance of these early reflexes, the same general rule may apply to other types of behavior of children. For example, might not the disappearance of the compulsive crying of the first three months of life be due to increasing cortical control over behavior? If this viewpoint about the development of a young child is correct, parents could assume less responsibility for the development of a child's abilities and more responsibility for setting the proper stage for their unfolding.

SUMMARY

In our study of a small group of infants it was observed that the loss of the toe grasp reflex and the pressure foot reflex is related somewhat more closely to the acquisition of the voluntary control of the feet and legs than to chronologic age.

Loss of the Babinski reflex occurs gradually during the first year and probably continues during the second year of a child's life. It is not related closely to acquisition of voluntary control of the feet and legs. Its rate of loss is much slower than that of the other two reflexes.

Mayo Clinic.

Case Reports

ESOPHAGOPLEURAL FISTULA FOLLOWING PERFORATION OF ESOPHAGUS BY FOREIGN BODY

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ESOPHAGOPLEURAL fistula following esophageal perforation by a foreign body is a rare condition. Three cases have ben reported, in 2 of which the diagnosis was first entertained because of the presence of food particles in the pleural cavity, while in the other case the condition was not discovered until autopsy. The diagnosis in the case reported here was established both by the presence of food particles in the pleural cavity and by fluoroscopic visualization of iodized oil U.S.P. passing through the fistula from the esophagus into the pleural cavity.

REPORT OF CASE

History.—R. H., a boy 5 years of age swallowed a safety pin at 7:30 p.m., July 31, 1946, and was admitted to the surgical service of Baltimore City Hospitals one-half hour later. He had been in good health before this accident. The child on admission to this service was afebrile, had no nausea, vomiting or abdominal pain and complained only of pain in the throat. At this time examination of the chest revealed nothing abnormal. Roentgenograms of the chest at this time showed an open safety pin lodged in the upper thoracic portion of the esophagus, with the point directed upward and to the right (fig. 1*A*).

Four hours later, an esophagoscopic examination was performed with topical use of tetracaine hydrochloride U.S.P. and drop ether anesthesia, and the pin was removed from the esophagus with some difficulty. After this procedure, the child had serious respiratory distress. A catheter was passed into the posterior pharynx, causing the child to cough up two chunks of meat, and the respiratory difficulty was relieved for a time, but by 8:00 a.m. on August 1 the temperature had risen to 104 F., the respiratory rate was 57 and the pulse rate 138. A pediatric consultation was requested, and after examination the patient was transferred to the pediatric service for further management.

Physical Examination.—On admission to the pediatric service the child was acutely and gravely ill. Respirations were rapid, and there was an obviously reduced respiratory excursion of the chest on the right side. The temperature was 103 F., the pulse rate 135 and the respiratory rate 56. The heart was displaced markedly to the left, the border of dulness being 2 cm. to the left of the nipple

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From the pediatric and surgical services of the Baltimore City Hospitals.

Read before the Pediatric Division of the Medical and Chirurgical Faculty of Maryland, Nov. 12, 1946.

line. The heart sounds were of good quality and were not distant. With the patient in a semierect position, the right side of the chest was hyperresonant in the upper half and flat in the lower half, and breath sounds were distant throughout. Succussion splash was not definitely elicited. The abdomen was soft and nontender, and the liver was not felt. The diagnosis of possible pneumothorax was made. A roentgenogram, made with the patient in the supine position, showed pronounced mediastinal shift to the left, with questionable collapse of the right lung and presence of bubbles of free air. Since the roentgenographic picture was not conclusive and the patient continued to do poorly, another roentgenogram was obtained about an hour later, this time with the child in the full erect position. The second roentgenogram showed a definite hydropneumothorax, with collapse of the lung on the right side (fig. 1*B*).

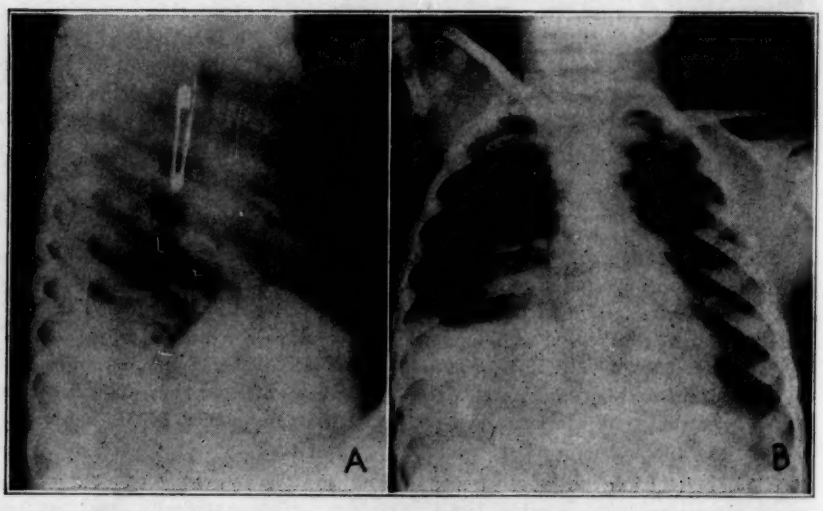

Fig. 1.—*A*, lateral view of the chest, showing safety pin lodged in the upper thoracic portion of the esophagus with the point open and directed upward. *B*, roentgenogram made with the patient erect, demonstrating hydropneumothorax present on the right side on the day after admission.

Treatment and Course.—Thoracentesis was performed, and 100 cc. of slightly bloody, thin, purulent fluid was removed. Also, under manometric guidance, about 400 cc. of air was removed. After this procedure, the child temporarily improved, the temperature dropped to 100 F. and the respiratory rate to 32. The border of cardiac dulness was now at the nipple line. A growth of anaerobic streptococcus was yielded from a culture of the pleural fluid. The child was given penicillin, 50,000 units, every three hours intramuscularly, sulfadiazine sodium intravenously and sulfadiazine by mouth, to total 3 Gm. a day. The child received nothing else by mouth but was supported by a 10 per cent solution of dextrose in distilled water administered parenterally and isotonic solution of sodium chloride given by continuous intravenous drip. He was also placed in an oxygen tent.

On August 2, the day after admission, the child showed signs of reaccumulation of pleural fluid. Another thoracentesis was performed, and 115 cc. of opaque, straw-colored fluid was removed. Penicillin, 20,000 units, in 20 cc. of distilled

water and 30 cc. of "azochloramid-tergitol" solution were instilled into the cavity.

On this day, the child's condition was somewhat improved, so that fluids, including milk, were given by mouth. On the following morning, or about eighty-four hours after admission, it was obvious that the fluid in the right pleural cavity was reaccumulating more rapidly. A fourth thoracentesis revealed 150 cc. of fluid resembling eggnog. It was suggested that this might represent ingested milk which had entered through a fistulous tract between the gastrointestinal

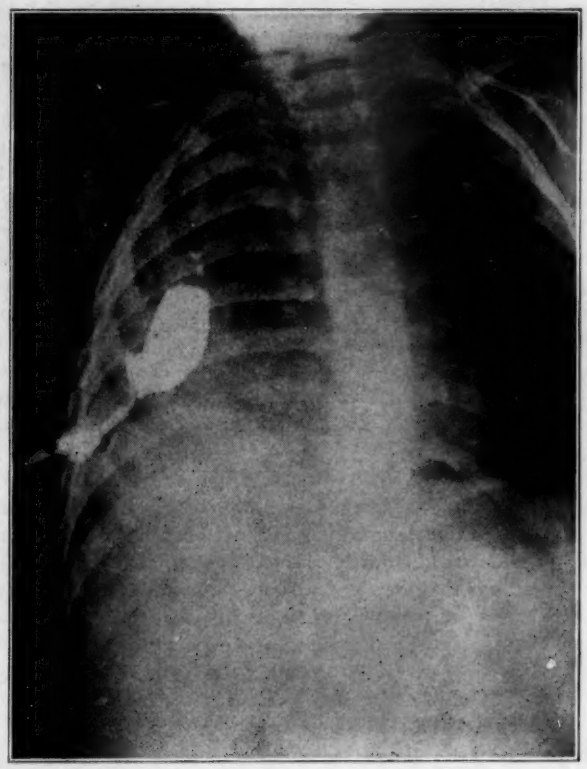

Fig. 2.—Roentgenogram made eighty-four hours after the child's admission to the hospital. Spurts of iodized oil are seen entering the upper right portion of the chest from the esophagus.

tract and the right pleural cavity. Consequently, under fluoroscopic visualization, iodized oil U.S.P. was instilled into the upper part of the esophagus and was seen to enter the right pleural space from the esophagus in considerable quantities at the level of the former lodgment of the foreign body (fig. 2). Shortly thereafter, a closed drainage thoractomy in the seventh right interspace in the midaxillary line was performed by Dr. Henry Rigdon, of the surgical service. A suction apparatus was attached to the inlying catheter, and continuous suction was maintained at a negative pressure of 1 cm. of mercury. A milk mixture diet high in caloric value, 1,500 cc. by Levin tube, and 625 cc. of a 5 per cent solution of protein hydrolysate ("amigen") N.N.R. intravenously were given daily. The pleural cavity was irrigated every two hours with 100,000 units of penicillin in 200 cc.

of isotonic solution of sodium chloride. Constant administration of oxygen was discontinued.

Despite the fact that the Levin tube was fluoroscopically visualized in the stomach, food particles were found in the pleural drainage system. Methylene blue, when injected into the Levin tube, appeared after about one minute at the end of the thoracotomy tube. Measurements of the drainage fluid from the right pleural cavity showed that several hundred cubic centimeters of milk mixture instilled into the stomach was being lost through the pleural fistula each day. This leakage was thought to be due to the regurgitation of fluid into the esophagus. At this time, the loss was not considered great enough to discontinue drainage by negative pressure or to change the mode of feeding. During the next several days, the child's temperature varied from 101 to 102 F., the respiratory rate from 40 to 60 and the pulse rate from 120 to 150.

By the fourteenth day, it had become evident that the regimen of feeding and drainage was not satisfactory. First, the patient's nutritive status was not being maintained. This lack of maintenance was primarily due to loss of food through regurgitation. Second, the pleural drainage tube frequently became clogged with curds. This obstruction allowed regurgitated feedings to remain stagnant in the right pleural cavity. It was decided to insert a Miller-Abbott tube into the duodenum and to feed the child through this. The Levin tube was left in the stomach and attached to the suction apparatus to draw out any gastric secretions or feedings which might get back into the stomach. The drainage through the thoracic catheter was left unchanged. The child's hemoglobin content had dropped from 13 Gm., on admission, to 9 Gm. He therefore received daily transfusions of whole blood and plasma, in addition to intravenous injections of "amigen" solution.

His condition, however, grew worse. He did not tolerate the Miller-Abbott tube well. He had several diarrheal stools each day, as well as abdominal distention and pain suggesting intermittent, partial obstruction of the intestine. Despite parenteral supportive therapy, he lost weight rapidly and became increasingly dehydrated. By the twentieth day he had lost 6½ pounds (3 Kg.), was moderately dehydrated and had a temperature of 104 F. It was decided to remove both the Miller-Abbott and the Levin tube and to support the child's nutrition by intravenous administration of fluids alone in order to reduce irritation of the esophagus. A test at this time with oral administration of dye showed the esophagopleural fistula to be widely patent.

The child was given fluids by continuous slow intravenous drip. During twenty-four hours, 2,000 cc. of an electrolyte solution,[1] containing 2.2 Gm. of sodium lactate, 0.58 Gm. of sodium chloride, 0.89 Gm. of potassium chloride and 0.25 Gm. of 5 per cent "amigen" in 5 per cent dextrose solution, 200 cc. of whole blood and 225 cc. of isotonic solution of sodium chloride were injected. He received 225 Gm. of dextrose and 25 Gm. of the mixture of amino acids per day. He was maintained on this regimen for five days, and at the end of this time he was considerably better. He was no longer dehydrated, and his temperature remained generally at 100 F. On the twenty-fifth day only a small trace of dye appeared at the end of the thoractomy drainage tube several minutes after oral administration, suggesting that the fistula had become smaller. Oral feedings of a liquid diet were started, but forty-eight hours later it became obvious that feedings had been started too soon. On the twenty-seventh day his condition was

1. Electrolyte solution of A. M. Butler prepared for experimental use by Mead Johnson and Company, Evansville 2, Ind.

again poor. His temperature was 104 F., his respiratory rate 66 and his pulse rate 140. He was slightly cyanotic and considerably dehydrated. An oral dye indicator test showed large quantities of dye appearing almost immediately in the pleural drainage. Presumably, the resumption of feeding had broken down the incompletely healed fistula. He was again maintained only on intravenous administration of fluids as before. On the thirty-third day, after rapid improvement, an oral indicator dye test showed the fistula to be closed, and full oral feedings of fluids were again started; intravenous administration of fluids was discontinued. Leakage of material from the lumen of the esophagus into the pleural space did not occur thereafter, although iodized oil U.S.P. injected through the thoractomy tube was visualized in the esophagus as late as the forty-first day.

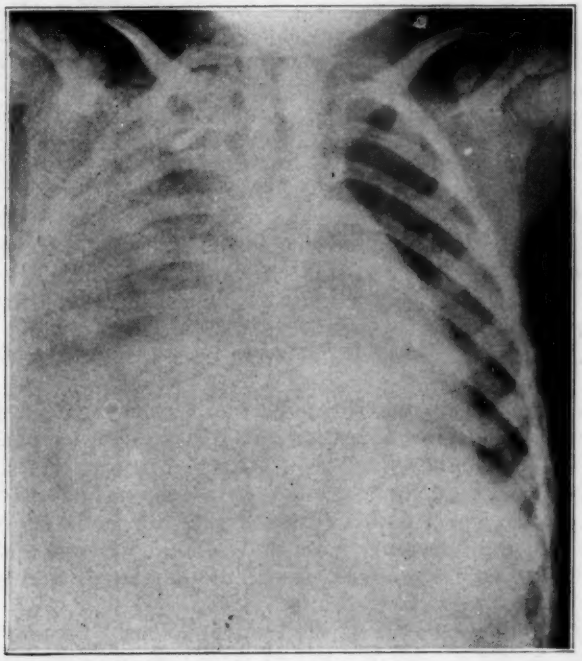

Fig. 3.—Roentgenogram made forty-one days after the child's admission to the hospital. Iodized oil injected into the pleural drainage tube is seen filling a large pocketed area on the right of the midchest. It is also seen in the stomach.

After the thirty-third day, the child gained weight rapidly but had occasional spikes in temperature to 100 F., and on the thirty-ninth day to 103 F. There was practically no drainage from the catheter in the pleural space. Because of the intermittent fever and poor drainage, the possibility of a blind pocket in the right pleural space was entertained. On the forty-first day, iodized oil U.S.P. was injected through the catheter under pressure, and a long, norraw sinus from the point of injection emptying into a large pocket about 3 by 5 cm. to the right of the midchest was visualized (fig. 3). In order to obtain better drainage of this pocket, an open thoractomy was performed by Dr. Otto Brantigan, of the surgical service. Posterior portions of the sixth and seventh ribs were resected, and, after blunt dissection into the pocketed area, three drainage tubes were left in place. After this final procedure, the patient did well, remained afebrile and showed

rapid reexpansion of the affected lung. He was placed on a regular diet on the forty-seventh day, and chemotherapy was discontinued on the fifty-eighth day. Thirty days after the operation (two and one-half months after admission), the drainage tubes were pushed out by the reexpanding lung and were not reinserted. Three and one-half months after admission to the hospital the patient was discharged in good condition, with a fully healed wound and no residual scoliosis. A roentgenogram of the chest at this time showed a well expanded right lung.

Laboratory Observations.—On admission to the hospital the hemoglobin content was 13 Gm. per hundred cubic centimeters; the red blood cell count, 4,680,000, and the white blood cell count, 9,240, per cubic millimeter, with 64 per cent polymorphonuclear leukocytes, 28 per cent lymphocytes and 8 per cent monocytes. The day after his admission the white cells numbered 15,280. On the twelfth day the hemoglobin content was 9 Gm. per hundred cubic centimeters but rose again to 13 Gm. after repeated transfusions. The sulfadiazine level of the blood varied from 3 to 8.5 mg. per hundred cubic centimeters. The urine was always normal.

COMMENT

The accidental swallowing of foreign bodies by children is, unfortunately, a common occurrence. Many of these bodies lodge in the cervical portion of the esophagus, and a few are caught in the thoracic portion. Of 67 cases reported by Head,[2] the foreign body lodged in the latter portion in only 17 per cent. A very small percentage of these foreign bodies, even though known to be sharp, ever perforate the esophagus of a child. In a series reported by Clerf,[3] of 77 swallowed safety pins (practically all of which were open), only 3 perforated the esophagus.

Most perforations of the esophagus result in an acute mediastinitis, periesophagitis or abscess formation. If the cervical esophagus is involved, direct surgical drainage is readily performed. It is extremely rare for a perforation of the esophagus by a foreign body to result in a primary esophagopleural fistula. Only 3 previous unquestionable cases can be found in the literature, those of Wallfield,[4] Head[2] and Paas,[5] in which there was no previous disease of the esophagus and in which a fistula was clearly demonstrated (table).

Many other cases, 85 in all, of esophagopleural fistulas have been reported, but in these cases the lesions were due to other causes. In 45 of these cases the fistula was due to spontaneous rupture of the esophagus.[6] Williams and Boyd[7] concluded that spontaneous rupture of the

2. Head, J. R.: The Surgical Indications in Perforation of the Esophagus by Foreign Bodies, Am. J. Surg. **42**:266-274 (Oct.) 1938.

3. Clerf, L. H.: Safetypins in the Esophagus, Arch. Otolaryng. **24**:282-288 (Sept.) 1936.

4. Wallfield, M. J.: Pleural Manifestations of Perforation of the Esophagus, Am. J. Dis. Child. **58**:1261-1264 (Dec.) 1939.

5. Paas, H. R.: Selbstdrainage eitriger Mediastinitis in den perforierten Oesophagus: Oesophagus-Pleurafistel; Heilung, Deutsche Ztschr. f. Chir. **247**:495-500, 1936.

6. Gott, R., Jr.: Spontaneous Rupture of the Esophagus, with a Report of Four Cases, Am. J. M. Sc. **186**:400-409 (Sept.) 1933. Benson, C. D., and Penberthy, G. C.: Rupture of the Esophagus in a Child Two Years of Age, with Recovery, Surgery **4**:777-780 (Nov.) 1938.

Reported Verified Cases of Esophagopleural Fistula Due to Perforation of the Esophagus by a Foreign Body

Author	Foreign Body	Sex	Age, Yr.	Side Affected	Orgarism Yielded in Culture	Mode of Discovery	Treatment	Mediastinitis	Duration of Fistula	Result	Autopsy Performed
Paas, 1936	Partial denture	F	44	Right	.....	Food in drainage, oral indicator dye	Open thoracotomy	Yes	1 wk.	Recovered	.....
Head, 1938	Chicken bone	M	37	Left	....	Not before death	Mediastinotomy	Yes	.....	Died, 4 days	Yes
Wallfield, 1939	Chicken bone	F	3	Right	Lactobacillus acidophilus, yeast	Food in drainage, iodized oil U.S.P. visualization	Thoracotomy; gastrostomy	No	.....	Died, 2 days	No
Hughes, 1947	Safety pin	M	5	Right	Anaerobic streptococcus	Food in drainage, visualization of iodized oil U.S.P.	Closed and open thoracotomy	No	41 days	Recovered	.....

esophagus is preceded by inflammatory changes which weaken its wall. In 18 cases it was due to empyema necessitatis, with rupture into the esophagus.[8] Tuberculous empyema or tuberculous caseous necrosis of mediastinal lymph nodes was responsible in 10 cases.[9] Perforation due to carcinoma was reported in 3 cases.[10] Ballin and Salzstein[11] and Fonte[12] reported 3 cases in which perforation was caused by peptic-esophageal ulcers. In the other 3 cases the etiologic factor was instrumentation of strictures.[13]

The diagnosis of esophagopleural fistula is usually first suspected from the presence of food in the thoracic cavity. It can be confirmed by having the patient drink an indicator dye, such as methylene blue, and finding it in the pleural drainage. The fistula can be localized by the instillation of iodized oil into the esophagus and the demonstration of its point of entrance through the esophagus into the thoracic cavity. One can also gain an impression of the size of the fistula by the amount of contrast medium which is seen to enter the thorax. In Wallfield's[4] case, a fistulous connection was first suspected as the result of the presence of Lactobacillus acidophilus in the fluid in the pleural cavity.

Before the availability of potent chemotherapeutic agents, esophagopleural fistula was looked on as a more or less uniformly fatal condition. Thursfield,[14] in describing a case of esophagopleural fistula in 1902, commented:

> The complication is rather of pathological than clinical interest, for it is difficult to suggest any mode of treatment which would either prevent, palliate or remove the lesion.

Broyles[15] in 1930, commented: "Rupture or perforation of the esophagus results in a mediastinal infection which is fatal." However, in more

7. Williams, T. H., and Boyd, W.: Spontaneous Rupture of the Esophagus, Surg., Gynec. & Obst. **42**:57-60 (Jan.) 1926.

8. Brewer, A. A.: Esophagopleural Fistula Complicating Empyema, Radiology **47**:371-376 (Oct.) 1946. Brown, T. A.: Symptomless Perforation of the Esophagus, Lancet **2**:1272-1273 (Dec. 16) 1922.

9. Cohen, W., and Sindell, E. A.: Esophagopleural Fistulas, West. J. Surg. **50**:238-249 (May) 1942.

10. Abbott, O. A.: Abnormal Esophageal Communications: Their Types, Diagnosis, and Therapy, J. Thoracic Surg. **14**:382-392 (Oct.) 1945. Friedenwald, J., and Morrison, T. H.: Perforation of the Esophagus Due to Instrumentation, Am. J. M. Sc. **167**:194-202 (Feb.) 1924.

11. Ballin, M., and Salzstein, H. C.: Perforation of the Esophagus, Surg., Gynec. & Obst. **34**:42-50 (Jan.) 1922.

12. Fonte, G.: Perforation of Esophagus into Pleura, Brasil-med. **2**:4 (July 1) 1922; abstracted, J. A. M. A. **79**:1085 (Sept. 23) 1922.

13. Morl, R.: Oesophagusperforationen in die Pleurhole, Beitr. z. klin. Chir. **155**:487-500, 1933.

14. Thursfield, H.: A Case of Pleuro-Esophageal Fistula, Tr. Path. Soc. London **53**:51-53, 1902.

15. Broyles, E. N.: Oesphagus, in Lewis, D.: Practice of Surgery: Clinical, Diagnostic, Operative, Postoperative, London, John Murray, 1930, vol. 4, chap. 8, p. 11.

recent years, a brighter attitude has been taken toward this complication. In Paas's opinion the esophagopleural fistula in his case was life saving, as it permitted spontaneous drainage of the infected mediastinum. For many years, surgical closure of the fistula was suggested. It was finally attempted successfully in 1943 by Berman and Walters.[16] Most surgeons, recalling the words of Chevalier Jackson[17] that the esophagus is surgically the most intolerant organ in the body, prefer a conservative approach to therapy. In the present case, conservative management was thought to be indicated in part because of the elapsed time of four days before discovery of the fistula and the consequent heavy contamination of the pleural space.

The persistence of the fistula for so long a period in this case may have been influenced by two conditions. First, the frequent and vigorous irrigation of the pleural cavity with penicillin solution may have been a factor in the prolongation of the fistulous opening. Two hundred cubic centimeters was given every two hours, and, although most of the solution was almost immediately withdrawn thereafter, there was a momentary increase of tension in the pleural space. An even greater factor may have been the presence of one or more tubes in the esophagus. When they were removed, the fistula was noted to heal more rapidly. Cohen and Sindell[9] commented in their report:

> In those cases where fistula develops suddenly in the absence of periesophageal disease, as in the traumatic rupture of the esophagus, an acute periesophagitis usually develops. In this event, local rest is essential. Passing a stomach tube or allowing nourishment by mouth will add insult to an already injured area.

They further added that this condition calls for gastrostomy. Gastrostomy was considered in this case, but it was not performed because regurgitation of stomach contents through the fistula was already present. It did not seem advisable to subject the child to this major surgical procedure when it promised so little aid in the maintenance of the patient's nutritive status.

Without gastrostomy, and with the removal of the Levin and Miller-Abbott tubes, it became necessary to attempt maintenance of the nutritive state by parenteral means alone. With the use of the special electrolyte solution in 10 per cent solution of dextrose, of saline solution, blood, plasma and "amigen" and parenteral administration of vitamins, the essential nutritive elements were supplied and the child was kept well hydrated. The daily caloric intake was approximately 1,000 calories. The desire to boost the caloric intake prompted the premature resumption of oral feeding. As a result, the nearly healed fistula broke down. Oral feedings had to be discontinued once more and the parenteral regimen employed for a few additional days.

In retrospect, had the esophagus been fully rested when the fistula was first discovered, and while the child's nutrition was considerably better than it was later, it is likely that the fistula would have closed sooner and the whole course of the child's illness would have been

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16. Berman, J. K., and Walters, C. F.: Empyema Complicated by Broncho-Esophagopleural Fistula, Ann. Surg. **117**:100-105 (Jan.) 1943.

17. Jackson, C.: Peroral Endoscopy and Laryngeal Surgery, St. Louis, Laryngoscope Company, 1915.

shortened considerably. The rapidity with which the fistula healed when oral feedings were discontinued was striking.

It is also noteworthy that closed catheter drainage of the pleural cavity was not sufficient to allow the reexpanding lung to seal off the plueral space completely. Because of a pocketed area of empyema in the midchest, it was necessary to perform an open thoracotomy drainage to bring about final closure.

SUMMARY

A case of esophagopleural fistula following esophageal perforation by a foreign body, with subsequent recovery, is reported. Healing of the fistula did not occur until oral feeding and tube feeding were stopped and the child maintained on parenteral alimentation.

A brief review of all causes of esophagopleural fistula is given.

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Progress in Pediatrics

STUDIES ON THE RELATION OF THE HEMOLYTIC STREPTOCOCCUS TO RHEUMATIC FEVER

I. Review of Serologic Literature

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THE ETIOLOGIC basis of rheumatic fever is at present unknown. Since the disease is in all likelihood an infectious one, many direct bacteriologic and virologic studies on it have been carried out in recent decades. None of these studies has identified any organism responsible for the phenomena of this disease. Epidemiologic observations have, however, given indications of some relation between rheumatic fever and infection by the hemolytic streptococcus. These studies were critically reviewed by Paul and associates.[1]

The suggested relation between hemolytic streptococcic infection and rheumatic fever, in the absence of bacteriologic identification, led to a large volume of work in which attempts were made to identify or evaluate the role of this organism in rheumatic fever by immunologic tests. A few studies of cutaneous sensitivity to streptococcic materials were carried out, but the great majority of the immunologic work reported dealt with serologic investigations. It is the latter type of studies which will be reviewed in the present paper.

The serologic studies of streptococcic materials in rheumatic fever are naturally divisible into groups according to the antigen employed and the corresponding tests. The tests used in various studies of this problem were: (1) agglutination tests, (2) precipitation tests with the M protein, (3) precipitation tests with the C carbohydrate, (4) precipitation tests with streptococcic nucleoproteins, (5) neutralization tests with

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1. Paul, J. R., and others: The Epidemiology of Rheumatic Fever and Some of Its Public Health Aspects, ed. 2, New York, Metropolitan Life Insurance Company, 1943.

streptococcic fibrinolysin, the antifibrinolysin test and (6) neutralization tests with streptococcic hemolysin, the antistreptolysin test.

Of these groups of studies the last two, especially the last one, were the most extensive.

1. *Agglutination Tests.*—Agglutination tests with the hemolytic streptococcus present serious technical difficulties because of nonspecific effects[2] and because of difficulties in the maintenance of stable suspensions of the organisms in saline solution.[3] Such tests have, however, been applied to serums of rheumatic patients. Keefer, Myers and Oppel[4] reported that by their technic 26 per cent of patients with acute rheumatic fever showed agglutinins for hemolytic streptococci, as compared with 23 per cent of patients with erysipelas. Only 9 per cent of patients with rheumatic heart disease showed such agglutinins. McEwen, Bunim and Alexander[5] also used a technic in which no normal serums gave positive reactions to the tests. They found agglutinins in the serum of 27 per cent of patients with acute streptococcic diseases, but in that of only 5 per cent of patients with acute rheumatic fever. Goldie and Griffiths[3a] employed a more sensitive test, one by which 10 per cent of normal subjects showed an antistreptococcic agglutinin titer of 100 or more. In their series such titers were shown by 80 per cent of serums from patients with acute rheumatic fever and 89 per cent of those with acute streptococcic infection.

2. *Precipitin Tests with M Protein.*—Two small studies were reported of precipitin tests with the type-specific M protein. In the interpretation of these data, as well as those from precipitin tests with other antigens, to be reviewed later, it must be recalled that precipitin titers, as determined by serial dilution of the antigen, do not provide a measure of the

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2. Tillett, W. S., and Abernathy, T. J.: Serological Reactions with Hemolytic Streptococci in Acute Bacterial Infections, Bull. Johns Hopkins Hosp. **50**: 270 (April) 1932. Weaver, G. H.: Agglutination of Streptococci, Especially Those Cultivated from Cases of Scarlatina, by Human Sera, J. Infect. Dis. **1**:91 (Jan.) 1904.

3. (*a*) Goldie, W., and Griffiths, G. J.: Aetiological Relation of the Streptococcus Haemolyticus to the "Rheumatic" Diseases, Brit. M. J. **2**:755 (Oct. 17) 1936. (*b*) Mudd, S.; Czarnetzky, E. J.; Lackman, D., and Pettit, H.: The Antigenic Structure of Hemolytic Streptococci of Lancefield Group A: I. The Preparation of a Labile, Type-Specific Antigen; Its Identification as the Griffith Type-Specific Agglutinogen and as a Substance from Which a Group-Specific and a Type-Specific Hapten Are Derivable, J. Immunol. **34**:117 (Feb.) 1938.

4. Keefer, C. S.; Myers, W. K., and Oppel, T. W.: Streptococcal Agglutinins in Patients with Rheumatoid Arthritis and Rheumatic Fever, J. Clin. Investigation **12**:267 (March) 1933.

5. McEwen, C.; Bunim, J. J., and Alexander, R. C.: Bacteriologic and Immunologic Studies in Arthritis: II. Results of Various Immunologic Tests in Different Forms of Arthritis, J. Lab. & Clin. Med. **21**:465 (Feb.) 1936.

homologous antibody in the serum tested. The other method of recording results of precipitin tests, that of estimating the mass of precipitate by steps ranging from 1 to 4, yields data which vary in the direction of the true concentration of antibody in the serum, but which provide at best a crude estimate of that concentration.

Using the latter method, Swift and Hodge[6] estimated the concentration of anti-M precipitins in the serums of 17 patients with acute rheumatic fever and of 24 patients with acute streptococcic infections. They observed that both groups showed these antibodies, but that a higher percentage of the nonrheumatic patients showed strong reactions and that in the nonrheumatic group the maximum titer was reached slightly earlier than in the group of rheumatic patients. In a small series consisting of 2 rheumatic and 4 control patients, Coburn[7] was able to observe anti-M precipitins a few days earlier in the patients with pharyngitis than in those with rheumatic fever.

3. *Precipitin Tests with the C Carbohydrate.*—McEwen, Bunim and Alexander[5] tested the serums of rheumatic subjects and of several control groups for precipitins to the group-specific carbohydrate of group A hemolytic streptococci. They observed that 24 per cent of normal subjects showed such precipitins. The percentages among patients with streptococcic disease and rheumatic fever were 62 and 55, respectively.

4. *Precipitin Tests with Streptococcic Nucleoproteins.*—Coburn and Pauli[8] examined the serums of 50 patients with acute rheumatic fever for the presence of precipitins to the streptococcic "D" fraction of Heidelberger and Kendall.[9] They observed such precipitins in 96 per cent of the patients but did not find them in the serums of any of 6 persons convalescing from acute streptococcic infections.

5. *Antifibrinolysin Tests in Rheumatic Fever.*—By far the greatest concentration of serologic investigation of rheumatic fever with streptococcic antigens has been on two neutralization tests, the antifibrinolysin test and the antistreptolysin test. Although epidemiologic observations had proved a strong indication for an analysis of the relationship between the

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6. Swift, H. F., and Hodge, B. E.: Type-Specific Anti-M Precipitins in Rheumatic and Non-Rheumatic Patients with Hemolytic Streptococcal Infections, Proc. Soc. Exper. Biol. & Med. **34**:849 (June) 1936.

7. Coburn, A. F.: Observations on the Mechanism of Rheumatic Fever, Lancet **2**:1025 (Oct. 31) 1936.

8. Coburn, A. F., and Pauli, R. H.: Studies of the Relationship of the Streptococcus Hemolyticus to the Rheumatic Process: III. Observations on Immunological Responses of Rheumatic Subjects to the Hemolytic Streptococcus, J. Exper. Med. **56**:651 (Nov.) 1932.

9. Heidelberger, M., and Kendall, F. E.: Protein Fractions of a Scarlatinal Strain of Streptococcus Hemolyticus, J. Exper. Med. **54**:515 (Oct.) 1931.

hemolytic streptococcus and rheumatic fever, technical difficulties had presented an obstacle to such studies. Since the orthodox precipitin test cannot be carried out by the dilution of serum, it could not be applied to the measurement of antibodies, and in the case of the only available test in which it was possible to dilute serum—the agglutination test—there were other technical difficulties, which were mentioned previously. After two neutralization tests were described for measuring antibodies to streptococcic products in 1932 and 1933, studies were begun in many clinics on the antibodies to the streptococcic antigens involved, the hemolysin and fibrinolysin.

The antifibrinolysin tests followed the discovery, by Tillett and Garner,[10] of a substance produced by the hemolytic streptococcus in culture which lysed human fibrin. Later, these authors showed that the fibrinolysin was antigenic, so that plasma clots of patients with acute streptococcic infections resisted the lytic action of fibrinolysin by virtue of the antibodies contained in the plasma.[11] In a later study, Tillett[12] showed that of 8 patients with acute rheumatic fever all gave a positive reaction to the antifibrinolysin test, as did 75 per cent of 38 patients with acute streptococcic infections. Hadfield, Magee and Perry[13] tested clots of 21 children with recent attacks of rheumatic fever and observed that 10 gave positive reactions to the tests, as compared with none among the normal controls and the patients with quiescent rheumatic fever.

Myers, Keefer and Holmes[14] observed that 91 per cent of children with acute rheumatic fever had plasma clots resistant to fibrinolysis in comparison with 82 per cent of patients with acute streptococcic disease. None of the normal children had positive reactions to the tests. Among patients with acute nonstreptococcic infections, 2 of 22 gave positive reactions.

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10. Tillett, W. S., and Garner, R. L.: The Fibrinolytic Activity of Hemolytic Streptococci, J. Exper. Med. **58**:485 (July) 1933.

11. Tillett, W. S.; Edwards, L. B., and Garner, R. L.: Fibrinolytic Activity of Hemolytic Streptococci: The Development of Resistance to Fibrinolysis Following Acute Hemolytic Streptococcal Infections, J. Clin. Investigation **13**:47 (Jan.) 1934.

12. Tillett, W. S.: The Occurrence of Antifibrinolytic Properties in the Blood of Patients with Acute Hemolytic Streptococcus Infections, J. Clin. Investigation **14**:276 (March) 1935.

13. Hadfield, G.; Magee, V., and Perry, C. B.: The Lysis of Fibrin by Streptococci: Its Application to the Problems of Rheumatic Infection in Children, Lancet **1**:834 (April 21) 1934.

14. Myers, W. K.; Keefer, C. S., and Holmes, W. F., Jr.: The Resistance to Fibrinolytic Activity of the Hemolytic Streptococcus, with Special Reference to Patients with Rheumatic Fever and Rheumatoid (Atrophic) Arthritis, J. Clin. Investigation **14**:119 (Jan.) 1935.

Stuart-Harris[15] obtained positive reactions to tests in 60 per cent of patients with active rheumatic fever and in 50 per cent with streptococcic infections. Among a group of convalescent rheumatic patients who had streptococcic tonsillitis, however, the percentage was 80. McEwen and associates,[5] taking a somewhat higher level of clot resistance as significant of a positive reaction, observed that 6 per cent of their normal subjects gave positive reactions to tests, whereas all the patients with acute streptococcic disease and 59 per cent of those with acute rheumatic fever did so.

Waaler,[16] using a different technic and a different set of standards from that set by Tillett, observed that of 6 patients with acute rheumatic fever 4 had increased antifibrinolysin, and that it tended to return to normal on recovery. Perry[17] observed increased resistance to fibrinolysin in 78 per cent of rheumatic subjects and in the same percentage of patients with acute streptococcic disease.

Boisvert,[18] using a slight modification of Tillett's technic, observed no elevation in antifibrinolysin in 15 normal persons. Increased clot resistance was seen in 89 per cent of patients with acute streptococcic infection and in 89 per cent of those with acute rheumatic fever.

In a recent study of antifibrinolysin in serums of rheumatic patients by Winblad,[19] the percentage of positive reactions was reported to be 78 in patients with acute rheumatic fever and 42 in the same patients three months later. In streptococcic tonsillitis, the corresponding percentage was 92, although in scarlet fever only 38 per cent gave positive results.

Finally, Mote and Jones[20] also compared the antifibrinolysin titers of patients with streptococcic and rheumatic infections. In acute streptococcic infection they found that 61 per cent of the patients showed increased clot resistance. In first rheumatic episodes with preceding infection of the upper respiratory tract, the percentage was 86, whereas in the absence of foregoing respiratory infection it was 80.

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15. Stuart-Harris, C. H.: A Study of Haemolytic Streptococcal Fibrinolysis in Chronic Arthritis, Rheumatic Fever and Scarlet Fever, Lancet **2**:1456 (Dec. 28) 1935.

16. Waaler, E.: Development of Antifibrinolytic Properties in Blood of Patients with Rheumatic Fever, Chronic Infective Arthritis and Bacterial Endocarditis, J. Clin. Investigation **16**:145 (Jan.) 1937.

17. Perry, C. B.: The Relationship Between Acute Rheumatism and Streptococcal Antifibrinolysin, Arch. Dis. Childhood **14**:32 (March) 1939.

18. Boisvert, P. L.: (*a*) The Streptococcal Antifibrinolysin Test in Clinical Use, J. Clin. Investigation **19**:65 (Jan.) 1940; (*b*) The Fibrinolysin Test in Rheumatic Fever, J. Pediat. **18**:357 (March) 1941.

19. Winblad, S.: Studies in Haemolytic Streptococcus Fibrinolysin, Antifibrinolysin and Antistreptolysin, with Particular Reference to Rheumatic Fever, Acta path. et microbiol. Scandinav., 1941, supp. 44, p. 1.

(Footnotes continued on next page)

6. *Antistreptolysin Tests.*—In 1932, Todd[21] observed that the hemolysin characteristic of beta hemolytic streptococci was liberated into the medium of broth cultures of the organism and could be detected in solution there. He observed also that the hemolysin was antigenic, so that neutralizing antibodies appeared in the serums of patients with streptococcic disease and of rabbits immunized with streptococci. He described a serologic test in which various dilutions of the serum to be tested were added to a constant amount of supernate from the culture of hemolytic streptococci, the hemolytic potency of which had been standardized. After allowance of time for neutralization of the hemolysin by serum antibodies, a standard suspension of erythrocytes was added to test for residual, unneutralized hemolysin. He reported[22] that the serums of many normal subjects could be diluted fifty fold and yet neutralize the standard amount of hemolysin (i.e., an antistreptolysin titer of 50). All the patients with streptococcic pharyngitis whom Todd examined had antistreptolysin titers of more than 140. Among persons with active rheumatic fever, Todd observed titers ranging from 110 to 1,250, with an average of 300, but only 16 per cent of patients with quiescent rheumatic fever had titers of more than 100. He suggested that this last titer be taken as the upper limit of normal values.

Taking 50 as the upper limit of normal titers, Griffiths[23] reported that all the subjects with active rheumatic fever and 25 per cent of those with the quiescent type had elevated titers. He discovered, however, that among various groups of patients with nonrheumatic arthritides the percentage of positive reactions by this criterion varied from 0 to 80.

Myers and Keefer[24] reported many antistreptolysin titers above 100 in the normal subjects whom they examined and decided to designate

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20. Mote, J. R., and Jones, R. D.: Studies of Hemolytic Streptococcal Antibodies in Control Groups, Rheumatic Fever, and Rheumatoid Arthritis: I. The Incidence of Antistreptolysin "O," Antifibrinolysin, and Hemolytic Streptococcal Precipitating Antibodies in the Sera of Urban Control Groups, J. Immunol. **41**:35 (May) 1941; II. The Frequency of Antistreptolysin "O," Antifibrinolysin and Precipitating Antibody Responses in Scarlet Fever, Hemolytic Streptococcal Infections, and Rheumatic Fever, ibid. **41**:61 (May) 1941; III. The Magnitude of Antistreptolysin "O," Antifibrinolysin, and Precipitating-Antibody Responses; The Persistence of the Antibodies and Variations in Antistreptolysin "O" Curves in Scarlet Fever, Hemolytic Streptococcal Infections, and Rheumatic Fever, ibid. **41**:87 (May) 1941.

21. Todd, E. W.: Antigenic Streptococcal Hemolysin, J. Exper. Med. **55**:267 (Feb.) 1932.

22. Todd, E. W.: Antihaemolysin Titres in Haemolytic Streptococcal Infections and Their Significance in Rheumatic Fever, Brit. J. Exper. Path. **13**:248 (June) 1932.

23. Griffiths, G. J.: Antihaemolysin Titres in Chronic Rheumatic and Allied Diseases, Lancet **2**:251 (Aug. 4) 1934.

only titers above 200 as elevated. With that criterion they observed that 78 per cent of patients with acute rheumatic fever had elevated antistreptolysin titers. Among groups with various acute streptococcic infections, the corresponding percentages ranged from 66 to 89, and among groups with nonrheumatic arthritides the percentage ranged from 8 to 33.

Although Wilson, Wheeler and Leask[25] also followed Todd's technic, they were unable to obtain results similar to those quoted previously. Among patients with respiratory infections, they obtained the paradoxic result of higher antistreptolysin titers in the nonstreptococcic than in the streptococcic group. Two thirds of the rheumatic patients who had recurrences of rheumatic infection in the absence of clinical infection of the respiratory tract did not show rises in antistreptolysin titer. No data were given, however, on the comparison of antistreptolysin titers in patients with active and with quiescent rheumatic fever. They reported no correlation of titer with the clinical phase of the disease.

Coburn and Pauli[26] observed a consistent elevation of antistreptolysin titer in acute rheumatic fever. The average titer in their rheumatic patients was 490, as compared with 71 in the control group. The increase was frequently seen to coincide with the onset of rheumatic manifestations. The time of decline of the antistreptolysin titer to normal levels was long, often a full year. Of a group of 16 rheumatic subjects involved in a streptococcic epidemic, 14 had rheumatic recurrences, all with a rise in antistreptolysin titer. Blair and Hallman[27] also observed elevated antistreptolysin titers in all the patients with acute rheumatic fever whom they examined.

A similar association of elevated titers with acute rheumatic fever was observed by Goldie and Griffiths.[3a] The titers above 100 included

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24. Myers, W. K., and Keefer, C. S.: Antistreptolysin Content of the Blood Serum in Rheumatic Fever and Rheumatoid Arthritis, J. Clin. Investigation **13**:155 (Jan.) 1934.

25. Wilson, M. G.; Wheeler, G. W., and Leask, M. M.: The Relation of Upper Respiratory Infections to Rheumatic Fever in Children: II. Antihemolysin Titres in Respiratory Infections and Their Significance in Rheumatic Fever in Children, J. Clin. Investigation **14**:333 (May) 1935.

26. Coburn, A. F., and Pauli, R. H.: Studies on the Immune Response of the Rheumatic Subject and Its Relationship to the Activity of the Rheumatic Process: VI. The Significance of the Rise of Antistreptolysin Level in the Development of Rheumatic Activity, J. Clin. Investigation **14**:769 (Nov.) 1935; II. Observations on an Epidemic of Influenza Followed by Hemolytic Streptococcal Infections in a Rheumatic Colony, J. Exper. Med. **62**:137, (Aug.) 1935.

27. Blair, J. E., and Hallman, F. A.: Streptococcal Agglutinins and Antistreptolysins in Rheumatoid (Atrophic) Arthritis, J. Clin. Investigation **14**:505 (Sept.) 1935.

92 per cent of the rheumatic group and 13 per cent of the normal controls. If a criterion of 200 is used instead, the corresponding percentages were 80 and 0.

Longcope[28] observed antistreptolysin titers of more than 100 in 85 per cent of patients with acute rheumatic fever, as compared with 69 per cent of those with erysipelas and 44 per cent of those with scarlet fever. These titers were considerably higher than those of the normal group, 75 per cent of which fell below 50. McEwen and his co-workers[5] reported that 94 per cent of the patients with acute rheumatic fever and 83 per cent of those with acute streptococcic disease had titers greater than 100. Six per cent of their normal subjects fell within that range.

In a second study, Todd and associates[29] raised the upper limit of normal titers somewhat. They accepted a range of 100 to 200 as indicative of a "probable recent infection" and a titer of 200 or more as being "more certain." In this series of tests they observed that 62 per cent of patients with streptococcic pharyngitis had antistreptolysin titers of 125 or more, as did 99 per cent of subjects with active rheumatic fever.

In the series of Bunim and McEwen,[30] all normal subjects had titers below 100. Of a group of patients with active rheumatic fever and polyarthritis, carditis or both, 80 per cent had antistreptolysin titers greater than 100, if a respiratory infection preceded the rheumatic episode. In the absence of respiratory infection the corresponding percentage was 64. Only 20 per cent of subjects with quiescent rheumatic fever had elevated titers. The titer was moderately increased in 80 per cent of patients with scarlet fever. Finally, normal antistreptolysin titers were reported for all subjects tested in a group including patients with rheumatoid and other arthritides, pneumonia and lupus erythematosus disseminatus.

Green[31] discovered 82 per cent of normal subjects to have antistreptolysin titers of less than 125. All his patients with scarlet fever had titers

28. Longcope, W. T.: Studies of the Variations in the Antistreptolysin Titer of Blood Serum from Patients with Hemorrhagic Nephritis: II. Observations on Patients Suffering from Streptococcal Infections, Rheumatic Fever and Acute and Chronic Hemorrhagic Nephritis, J. Clin. Investigation **15**:277 (May) 1936.

29. Todd, E. W.; Coburn, A. F., and Hill, A. B.: Antistreptolysin S Titres in Rheumatic Fever, Lancet **2**:1213 (Dec. 9) 1939.

30. Bunim, J. J., and McEwen, C.: The Antistreptolysin Titer in Rheumatic Fever, Arthritis and Other Diseases, J. Clin. Investigation **19**:75 (Jan.) 1940.

31. Green, C. A.: Observations on the Antistreptolysin O Titre in Relation to the Mechanism of Acute Rheumatic Fever, J. Path. & Bact. **53**:223 (Sept.) 1941.

above 125, as well as 63 per cent of patients with streptococcic pharyngitis. Of the patients with acute rheumatic fever included in this study, 80 per cent showed high titers, with an average titer of 444. The elevations to these titers occurred at the time of onset of a rheumatic episode, but there were cases of changes in titers without alteration in clinical status.

In the series reported by Winblad,[19] 20 per cent of 61 normal subjects had antistreptolysin titers at or above 200. This titer was exceeded by 88 per cent of patients with a variety of acute streptococcic diseases and 93 per cent of patients with acute rheumatic fever.

Mote and Jones,[20] in an exhaustive study of the available tests for streptococcic antibodies, used 150 as the normal antistreptolysin level for the population studied. Twenty-four per cent of the group of normal controls had titers above this level. With streptococcic infection, 86 per cent of patients had elevated antistreptolysin titers. With initial rheumatic episodes preceded by an infection of the upper respiratory tract the percentage was 90; in the absence of such foregoing infection it was 78. In rheumatic recurrences the corresponding percentages were 72 and 49.

Finally, Taran, Jablon and Weyr[32] reported that 63 per cent of subjects with active rheumatic fever had antistreptolysin titers of more than 250. As in the case of several earlier studies, no correlation was observed between antistreptolysin titer and clinical phase of rheumatic fever.

COMMENT

Clinical Significance of Positive Reactions to Antistreptolysin and Antifibrinolysin Tests.—The two tests under discussion are specific for streptococcic disease or contact. The only incidence of false positive reactions recorded was Boisvert's[18a] observation of positive reactions to antifibrinolysin tests in patients with acute pneumonia.

Despite the high incidence of elevated titers in acute rheumatic fever, however, the value of these tests in the laboratory diagnosis of this disease is impaired by the persistence of streptococcic antibodies in the circulation. Both antihemolysin and antifibrinolysin have been shown to persist in elevated titer in the blood for months after an acute hemolytic streptococcic disease; in a few cases the elevation persisted for a

32. Taran, L. M.; Jablon, J. M., and Weyr, H. N.: Immunologic Studies in Rheumatic Fever: II. Antistreptolysin Patterns in Rheumatic Children, J. Immunol. **53**:381 (Aug.) 1946.

33. Solomon, R. Z.: Persistence of Antibodies to Streptococcal Infection in Adolescents: Epidemiological Study in Boys' School, J. Infect. Dis. **73**:239 (Nov.-Dec.) 1943.

full year (Mote and Jones, [20] Solomon[33] and Yannet and Leibovitz[34]). This persistence is probably due to two factors: the breadth of specificity of the two antigens involved, and the common occurrence of hemolytic streptococci in normal and infected human throats. Thus, after a streptococcic infection, a small amount of hemolysin or fibrinolysin elaborated by hemolytic streptococci of any type, too few in number to cause an inflammatory reaction, might well serve as a "booster" to the antibody titer on being absorbed from the respiratory tract. For the same reason, it is impossible to speak of an absolute upper normal limit of concentration of either of these two antibodies in human serum. In almost any group of presumably normal subjects there will be some who reflect a recent subclinical contact with the hemolytic streptococcus by an elevated antistreptolysin titer. In the series of Rantz and associates,[35] some elevated antistreptolysin titers were observed in normal subjects even among noncarriers of streptococci, although a greater percentage of such titers occurred among those whose tonsils contained the hemolytic streptococcus (in the latter group the titers fell after tonsillectomy[35]). Because of these circumstances a positive reaction to an antistreptolysin or antifibrinolysin test may mean only that the patient has had a streptococcic infection within the past half year or more. Even if it is possible to exclude in a carefully observed patient the possibility of a streptococcic infection during so long a time, the chance remains that the patient may be one of the few whose antistreptolysin titer is elevated during health. A negative reaction to an antifibrinolysin or antistreptolysin test, however, is of greated significance, especially in the case of the antistreptolysin test, since the data recorded in the literature indicate approximately an 85 per cent expectancy of a high antistreptolysin titer in acute rheumatic fever. When the antistreptolysin titer is within normal limits there is, then, only one chance in seven that the patient has acute rheumatic fever.

Implications of the Data Reviewed as to the Streptococcic Origin of Rheumatic Fever.—The data on antifibrinolysin and antistreptolysin titers may be considered from two points of view. First, with respect to the two streptococcic antigens themselves and, second, with regard to the streptococcus as a whole.

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34. Yannet, H., and Leibovitz, A.: The Fibrinolysin Test Following Hemolytic Streptococcal Infection, Am. J. M. Sc. **205**:350 (March) 1943.

35. Rantz, L. A.; Jacobs, A. H., and Kirby, W. M. M.: Group A Hemolytic Streptococcus Antibodies: II. Griffith Type Agglutinin and Antistreptolysin Titers in Carriers and Non-Carriers, J. Clin. Investigation **22**:419 (May) 1943.

The data in the literature do not indicate that either hemolysin or fibrinolysin might be a specific agent in the pathogenesis of rheumatic fever. Almost all the authors quoted previously pointed out that the two titers did not increase or decrease concomitantly with changes in the degree of activity of the rheumatic process. The severest cases of rheumatic fever did not show the highest titers, and almost all series included some undoubted cases of rheumatic fever in which the two titers were within normal limits.

It is, however, well worth while to consider the implications of these data with respect to the streptococcus as a whole in relation to rheumatic fever. Various upper limits of normal were used in the investigations reported, and the percentage of abnormally high antistreptolysin titers and antifibrinolysin titers observed in patients with acute rheumatic fever varied over a considerable range in these studies. However, it will be noted that in the many studies in which comparisons were made between titers in acute rheumatic fever and those in streptococcic infection the percentage of elevated titers in each group was similar, regardless of the magnitude of the percentages in the respective series. This similarity in frequency of elevated titers between streptococcic and rheumatic infections does not by any means prove that the hemolytic streptococcus is the cause of rheumatic fever. It does, however, mean that these tests make an immunologic diagnosis of streptococcic infection or invasion in patients with acute rheumatic fever. Thus, they support the mass of epidemiologic evidence which indicates that the hemolytic streptococcus may have some role in the origin of rheumatic fever.

There is no paradox in the fact that the tests with these antigens indicate a connection between the hemolytic streptococcus and rheumatic fever. In view of the epidemiologic and serologic evidence relating the pathogenesis of the disease, for the hemolytic streptococcus contains or produces many antigens, any one of which might be a sensitizing agent responsible for the changes in rheumatic fever. Again, the hemolytic streptococcus produces agents which have biochemical effects on tissues and which might thereby be involved in the pathogenesis of rheumatic fever. In view of the epidemiologic and serologic evidence relating the hemolytic streptococcus to rheumatic fever, these possible mechanisms provide an indication for systematic analysis of immunologic and biochemical effects of streptococcic constituents and products on the tis-

sues of the rheumatic host. Such investigations are in progress in these laboratories; the results of the early studies are being reported in the current literature.[36]

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36. Harris, T. N.: Studies in the Relation of the Hemolytic Streptococcus to Rheumatic Fever: II. Fractionation of the Hemolytic Streptococcus by High-Speed Centrifugation, J. Exper. Med. **87**:41 (Jan.) 1948; III. Complement-Fixation with Streptococcal Nucleoprotein in Sera of Patients with Rheumatic Fever and Others, ibid. **87**:57 (Jan.) 1948. Harris, T. N., and Friedman, S.: IV. The Effect of Streptococcal Spreading Factor in Patients with Rheumatic Fever and Others, Am. J. Dis. Child., to be published. Harris T. N., and Harris, S.: V. Streptococcal Anti-Hyaluronidase (Mucin-Clot-Prevention) Titers in the Sera of Patients with Rheumatic Fever, Streptococcic Infection, and Others, Am. J. Med. Sc., January 1949, to be published. Harris, T. N.; Harris S., and Nagle, R. L.: VI. Comparison of Streptococcal Anti-Hyaluronidase (Mucin-Clot-Prevention) with Antibodies to Other Streptococcal Antigens in the Serum of Patients with Rheumatic Fever and Acute Streptococcal Infection, Pediatrics, to be published.

Society Transactions

CHICAGO PEDIATRIC SOCIETY

H. William Elghammer, M.D., *President*
Alvah L. Newcomb, M.D., *Secretary*
Regular Meeting, Dec. 16, 1947

Thrombotic Thrombopenic Purpura. Dr. Simon A. Wile and Dr. Karl Singer.

A peculiar syndrome of fever, severe anemia and thrombopenic purpura, associated with multiple platelet thrombi, was first described by E. Moschcowitz in 1925. Since then reports of 14 other cases have appeared in the literature under such titles as "generalized arteriolar and capillary thrombosis," "acute febrile anemia and thrombocytopenia with diffuse platelet thrombosis," and "thrombocytic acroangiothrombosis." No case has been diagnosed ante mortem. The clinical and pathologic observations in our case are almost identical with those previously reported.

A white girl 11 years of age entered the hospital because of weakness, fever and black and blue spots over the body. Two weeks prior to her admission she had had an infection of the upper respiratory tract with low grade fever. She seemed to recover after three days, but one week later she was extremely tired and listless, and the temperature was slightly elevated. At this time many black and blue spots appeared over the extremities.

Physical examination on admission revealed a pale, acutely ill child with a temperature of 101 F. There were numerous petechiae and ecchymoses over the trunk and extremities. Aside from several pea-sized, firm cervical lymph nodes, no adenopathy was observed. The heart was not enlarged. A grade 1 systolic murmur was heard over the base of the heart. The edge of the liver was 2 fingerbreadths below the costal margin and was slightly tender. The spleen was palpable 2 fingerbreadths below the costal margin.

Results of laboratory studies were as follows: Three cultures of the blood yielded no pathogenic organisms. A blood count revealed 7 Gm. of hemoglobin per hundred cubic centimeters; 2,740,000 red cells, and 5,230 white cells, with a platelet count of 21,000. A reticulocytosis of 4.5 per cent was present. Blood smear showed pronounced anisocytosis and poikilocytosis of red cells. Differential count revealed 60 per cent segmented polymorphonuclear leukocytes and 5 per cent nonsegmented forms, with 28 per cent lymphocytes and 7 per cent monocytes. The urine showed a 2 plus reaction for albumin and 5 red blood cells per high power field. The sedimentation rate was 39 mm. in one hour; a 4 plus reaction to the tourniquet test was obtained. The bleeding time was more than 20 minutes and clotting time 4 minutes. Prothrombin time was 102 per cent of normal, with poor clot retraction.

The course of the child's illness was progressively downhill. The temperature fluctuated between 101 and 106 F. terminally. On the third day the patient sud-

denly became incoherent, complained of dizziness and had paresthesias in all extremities. These symptoms disappeared after a few hours. Two days later she became restless, complained of severe frontal headaches and later was confused and disoriented. On the sixth day after her admission the patient lapsed into coma and died. An examination of the blood the third day after admission showed slight increase in the anemia, further decrease in platelet count and a leukemoid reaction, as evidenced by the presence of 8 per cent neutrophil myelocytes and 1 per cent promyelocytes. Another blood smear taken two days later showed disappearance of the leukemoid reaction. A sternal puncture revealed marked erythroid hyperplasia. The white cell series showed preponderance of the more immature forms. Most of the megakaryocytes, which were definitely increased in number, were normal in appearance.

At autopsy these essential observations were made: The skin was extremely pale with numerous areas of hemorrhage. Grossly, the epicardium showed several petechial hemorrhages. The myocardium, especially that of the right ventricle, was mottled with pinpoint and larger red spots. Small, yellowish brown discolorations were observed in close association with the red areas. The liver was enlarged. The cut surface was a light yellowish brown and dry. The spleen was enlarged; the cut section was dark red with faint trabecular outlines. The follicles were prominent. The surface of both kidneys was mottled with a large number of tiny reddish dots. The brain disclosed several areas of hemorrhage.

Histologic examination revealed innumerable thrombi throughout the sections of the heart. They were located in capillaries, arterioles and small arteries and consisted mainly of platelets and some fibrin, with no red blood cells. Similar thrombi were seen in the lungs, liver, spleen, kidneys, urinary bladder, adrenal glands, pancreas and brain. The general architecture of the lymph nodes was well preserved. Within the bone marrow there was decided increase of all cellular elements, particularly the megakaryocytes, as had been seen in the aspirated specimen. A few small thrombosed capillaries were also encountered.

In summary, the clinical picture in this disease is that of an acute febrile illness, characterized by severe anemia out of proportion to any observed loss of blood; hemorrhagic manifestations commonly seen in thrombopenic purpura, hepatosplenomegaly (in half the reported cases), bizarre and intermittent symptoms of central nervous system involvement and transient leukemoid reaction in the peripheral blood. This clinical picture is associated with the presence of platelet thrombi in the capillaries and arterioles of almost all organs of the body. The disease appears to be a distinct clinical entity, the cause of which is at present unknown.

We suggest the name "thrombotic thrombopenic purpura" for this syndrome, using the word "thrombotic" in the sense of "caused by thrombosis." This term is shorter and more descriptive than the cumbersome titles used heretofore, and it has the further advantage of emphasizing the most plausible theory of the pathogenic mechanism responsible for the thrombopenia in these cases, namely, the disappearance of platelets from the circulation due to formation of myriads of platelet thrombi.

In making a clinical diagnosis, it is essential that the clinician consider this rare disorder when confronted with a syndrome of thrombopenic purpura.

Treatment of Hyperthyroidism in Children with Thiouracil and Propylthiouracil. Dr. Ralph H. Kunstadter and Dr. Albert F. Stein.

Until the discovery of thiouracil, the medical management of hyperthyroidism in children was disappointing. This statement is verified by the frequency with

which hyperthyroid children come to thyroidectomy, as reported in the literature and shown on review of several cases observed in Sarah Morris Hospital during the past few years.

The influence of the thyroid hormone on growth and metabolism and its correlation or interrelation with the other glands of internal secretion are significant in the maturing child. Thyroidectomy imparts the risk of disturbance in growth and in endocrine function in general. We recall 4 thyroidectomized children observed during the past few years; 1 became a normal adult, 1 became hypothyroid, another hypothyroid with hypopituitarism and a third extremely obese and hypothyroid. Therefore, conservative treatment is desirable.

In 1943, Astwood tested the relative effectiveness of 106 chemical compounds in inhibiting the function of the thyroid gland in young rats. Two classes of compounds were reported to be active: thiourea derivatives and certain derivatives of aniline. The most effective drug in the entire group was thiouracil. Thiouracil and its derivatives act directly on the thyroid gland, preventing the synthesis of thyroid hormone (diiodotyrosine), which in excess produces thyrotoxicosis.

Thiouracil has proved a valuable drug for prolonged medical and preoperative treatment, but it has the disadvantage of frequent side effects: drug fever, agranulocytosis, leukopenia, cutaneous eruptions and urticaria. In severely toxic patients, particularly in those with toxic adenoma, thiouracil when used properly is more efficacious than strong iodine solution U.S.P. in preparation for thyroidectomy, but the operation should not be performed until the basal metabolic rate has approached normal. Iodine is substituted for thiouracil for about three weeks prior to surgical treatment, primarily to reduce the vascularity and friability of the gland resulting from thiouracil, thereby lessening the danger of operative hemorrhage.

The adult dose of thiouracil initially is from 0.4 to 0.6 Gm. daily, which is usually reduced by 0.1 Gm. in two weeks and then by 0.1 Gm. again in two weeks. This dose is maintained until the basal metabolic rate is normal, after which a maintenance dose of 0.2 to 0.1 Gm. is given. Williams and Janney used the full adult dose in treating 4 children whose ages varied from 10 to 14 years and a dose only slightly smaller for a child 7 years of age. All responded well except 1 child in whom neutropenia developed when thiouracil was increased to the minimum dose that reduced the basal metabolic rate to normal. All patients showed an eosinophilic reaction of the blood.

There is no hard and fast rule as to duration of treatment in the absence of untoward or toxic reactions. The drug can apparently be continued indefinitely. Beierwaltes and Sturgis offered the opinion that thiouracil therapy may be discontinued at the end of an average ten months with the prospect that 60 to 80 per cent of patients will experience a reatively permanent remission of symptoms. It was the practice of Williams and Janney to decrease and increase the amounts of drug given each patient on the basis of present and previous response, which seems the most logical method.

In 1945, after a two year study, Astwood and VanderLaan observed that appropriate substituents on the thiouracil molecule conferred a greatly increased activity. The compounds 6-ethylthiouracil and 6-*N*-propylthiouracil are among a group approximately ten times as active as thiouracil when tested on rats. They also exert a more lasting effect following a single dose. They have the further therapeutic advantage of a greater activity-toxicity ratio. While they are more toxic than thiouracil on the basis of weight, they are considerably less toxic in acute and in chronic experiments when administered in quantities calculated on

the basis of equivalent thyroid effect. Of the two drugs, propylthiouracil has been the more effective. In a recent series of 100 patients treated by Astwood, the results were excellent, and only occasional mild toxic reactions, such as itching, mild urticaria and headache, occurred. There was considerable individual variation in the minimum effective dose, some patients requiring as little as 59 mg. and others as much as 150 mg. daily to restore metabolic equilibrium. It was concluded that 50 mg. every eight hours is approximately the optimal dose for routine treatment in severer cases, that 50 mg. twice daily is adequate in milder cases and that an effective dose should be continued until all manifestations of the disease have been controlled, when smaller maintenance doses may be substituted.

Mild reactions were noted in 2 per cent of 450 cases by Bartels of the Lahey Clinic. Livingston and Livingston recently reported a case of agranulocytosis and hepatocellular jaundice—the first case of hepatic damage to be reported. Eisenmenger and Steele reported on a patient with thyrotoxicosis treated with thiouracil for six months and subsequently with propylthiouracil for four months, in whom severe leukopenia followed the use of the latter drug. In this patient, the basal metabolic rate fell to approximately normal. However, after administration of the usual therapeutic and maintenance doses for a month, the basal metabolic rate rose and, in spite of an increase to a daily dose of 200 mg., remained elevated and thyrotoxicosis was evident. Because of this condition, and because agranulocytosis developed, use of the drug was discontinued, and the patient was prepared with strong iodine solution for thyroidectomy, which was accomplished successfully. After administration of propylthiouracil was discontinued, the leukocyte count gradually rose to normal.

It is clinically significant that a longer course and a larger dose of either drug is required to produce therapeutic effects in patients who have previously had iodine, particularly if iodine was given recently. In 1 case we observed that it took a considerable length of time to produce a fall in the basal metabolic rate when we changed from thiouracil to propylthiouracil while the rate was still elevated.

It should be remembered that, in spite of the fact that both drugs have a favorable influence on thyrotoxicosis, neither drug causes an appreciable decrease in the size of the gland, in most instances. It is commoner for the gland to increase in size during early weeks of treatment, because of stimulation by pituitary thyrotropic hormone released in excess as the thyroid hormone, which is a pituitary inhibitor, and is reduced by thiouracil and propylthiouracil. It was demonstrated that when the basal metabolic rate reached a normal level, the administration of thyroid U.S.P., ¼ to ½ grain (0.015 to 0.03 Gm.) daily, will frequently offset this factor and result in decrease in size of the gland and possibly decrease in exophthalmos. An added point is that neither thiouracil nor propylthiouracil causes decrease in exophthalmos.

Intestinal Obstruction in Newborn Infant Due to Extrinsic Tumor. DR. JOSEPH K. CALVIN.

Baby J. P., a white girl, weighed 7 pounds 6 ounces (3,345 Gm.) at birth; labor was normal, and the infant appeared to be in good condition. Vomiting began within twenty-four hours after birth. It was not forceful but almost continuous, and the vomitus was deeply bile stained. There was little abdominal distention. A firm, fixed tumor mass of the size and shape of a golf ball could be palpated easily in the midabdomen just to the left of the vertebral column.

Meconium stools were passed. The blood count was normal for a newborn infant. The diagnosis was made of a partial intestinal obstruction, probably resulting from an extrinsic tumor in the abdomen.

A flat roentgenogram of the abdomen revealed gas throughout the bowel, a sign which ruled out the presence of a complete atresia. "Umbrathor," a thorium dioxide contrast medium, given by mouth revealed moderate dilation of the duodenum and delay in passage of the contrast meal past the region of the ligament of Treitz. The roentgenograms and fluoroscopic findings were compatible with an obstruction in the retroperitoneal portion of the duodenum.

At operation a purplish tumor mass the size of a golf ball was seen lying adjacent to and overriding the upper pole of the left kidney. Adhesions between the retroperitoneal tumor and the retroperitoneal portion of the duodenum were producing a partial intestinal obstruction. Because of the precarious condition of this 5 day old infant the tumor could not be removed. The adhesions were divided; the obstruction was relieved, and the biopsy specimen of the tumor was taken. The pathologic report was as follows: "The specimen consists of a soft piece of gray and pink tissue having the appearance of brain. The microscopic diagnosis was a malignant type of sympathicoblastoma (neuroblastoma). Tumor emboli were seen in the blood vessels."

With the usual supportive measures, the infant recovered from the operation and was then given ten high voltage roentgen ray treatments anteriorly, and another ten posteriorly over the tumor. Subsequently, the tumor could not be felt, and the infant gained several pounds in weight.

When the infant was 3 months of age the vomiting recommenced; the infant failed to gain and secondary anemia developed. It soon became evident that obstruction had recurred. Roentgenograms disclosing dilated loops of jejunum confirmed this diagnosis but revealed no metastasis of the tumor. Operation was performed when the infant was 4 months old. Denser adhesions were observed in the area of the original ones, and an intussusception of the ileum due to adhesions was present. The tumor had shrunk to the size of a small marble. The intussusception was resected, and the obstructed jejunum was short circuited by a lateral anastomosis. After a stormy postoperative course, the infant now has a patent intestinal tract and a normal blood count.

Intestinal obstruction of the newborn may be caused by intrinsic development resulting in stenosis or atresia, or the bowel may be compressed from without, as in this patient. Extrinsic obstruction is oftener caused by congenital anomalies, such as enteric cysts, and less often by embryonal malignant tumors and inflammation, such as fetal peritonitis or abscess. In the 1931 edition of the *Medical Clinics of North America,* Abt thoroughly discussed fetal peritonitis with resulting adhesions, which cause such intestinal obstruction.

The cardinal symptoms of intestinal obstruction in the newborn are as follows: 1. Vomiting, which begins soon after birth, is frequent, copious, bile stained and nonprojectile—more likely to roll out. The higher the obstruction the greater the vomiting, as in this infant. 2. The abdomen is distended; the lower the lesion and the more complete the obstruction, the greater the distention. In this patient the distention was slight because the obstruction was only partial and was situated high in the intestinal tract. 3. Peristaltic waves are usually visible, but they were not seen in this infant. These symptoms are most prominent in atresia and least notable in extrinsic obstruction.

Generally, flat roentgenograms of the abdomen are sufficient to confirm the diagnosis, and use of contrast mediums is unnecessary. But in partial obstruction,

as in this infant, gas can enter all parts of the bowel, so that the site of obstruction cannot be determined without a contrast meal. However, when a contrast medium is necessary in the newborn, it must be one that remains liquid, such as thorium dioxide or iodized oil U.S.P., and not one that solidifies like barium sulfate, which might easily convert a partial obstruction into a complete one. In later roentgenograms made when the infant was 4 months of age, barium sulfate was used.

Sympathicoblastomas in infants are extremely malignant tumors. They usually arise in the adrenal glands, and metastasize from the right adrenal gland to the liver (Pepper type) and from the left adrenal gland to the orbital bones of the skull (Hutchinson type). Moreover, they are said to be relatively radioresistant. Yet in this patient, four months after roentgen ray therapy, the tumor was one-tenth its original size and had no obvious metastases. An optimistic note is that occasionally these embryonic tumors, especially under the influence of radiation therapy, metamorphose into benign ganglioneuromas, even after metastases have occurred, and the infant recovers.

The dense adhesions observed at the second laparotomy possibly resulted from the intense radiation therapy which may have produced an aseptic peritoneal irritation.

Atypical Cases of Poliomyelitis in 1947. DR. ARTHUR F. ABT.

The diagnosis of a case of paralytic poliomyelitis during an epidemic season should not be too difficult. Clinically, the disease may be diagnosed from the history, symptoms, signs and results of laboratory examination of the spinal fluid. In typical cases, seen after paralysis has occurred, the diagnosis should be self evident. However, in the prodromal or preparalytic stages, positive diagnosis is difficult. It can be made only during epidemic periods and then solely on probabilities. During the summer and fall of 1947, both in Chicago and throughout Illinois, public health officials reported that a high proportion of the cases designated as poliomyelitis showed no paralysis; headache, stiff neck and stiff back were almost invariably present, and increased numbers of cells were observed in the spinal fluid. In contrast to the usual picture, however, most of the cases in 1947 did not progress beyond this state. Furthermore, many cases showed various encephalitic signs of some degree.

The following brief case history is illustrative: J. B., a 6½ year old girl, was referred from a small community in central Illinois with the chief complaint of headaches. While she had complained of mild headaches for several years, she had experienced a severe headache with a febrile attack about one week before this first examination in Chicago. She was a thin, alert child, in no apparent pain or discomfort; she was not apprehensive and answered questions brightly for her age. At this time, she was afebrile and complained of intermittent headaches of varying intensity.

Results of the physical examination were essentially normal; there was no head drop, no stiffness of the neck on ventral flexion and no spinal sign. The deep and superficial reflexes were active and equal. The blood count showed 6,000 white cells, and there was no stippling of red cells. Urinalyses, serologic tests and chemical studies of the blood gave essentially normal results, as did blood agglutination tests. Reaction to the tuberculin test was negative. The blood pressure was normal. The spinal fluid was under no increased pressure; however, the cell count totaled 114 per cubic millimeter, of which 93 were lymphocytes and 21, neutrophils. Spinal fluid sugar measured 65 mg., protein totaled 31 mg. and chlorides 613 mg. per hundred cubic centimeters.

Therefore, the only noteworthy observations were: (*a*) the fact elicited from the history that the child had had a severe headache and fever seven days previously; (*b*) that poliomyelitis was epidemic; (*c*) that the headache continued intermittently, and (*d*) that the spinal fluid showed pleocytosis, with lymphocytic predominance. The child continued afebrile with the complaint of headache persisting. One week later, another spinal puncture revealed 67 white blood cells per cubic millimeter, of which 64 were lymphocytes and 3 were polymorphonuclear leukocytes. At this time, protein was 37.5 mg. and sugar 54 mg. per hundred cubic centimeters. Serologic tests of the spinal fluid gave negative results; there was no growth, no pellicle formation and no organisms on the stained smear. The white blood cell count was 5,200.

After the second lumbar puncture, the child no longer complained of headache. The appetite, previously poor, improved greatly, and she gained 3 pounds (1.3 Kg.) in a week. At this time careful examination of the eyegrounds showed no abnormality. The reflexes, which on the first examination had been brisk, were considerably diminished, particularly the knee jerks, which could be elicited only on reenforcement. A careful check of all muscle groups by a physical therapeutist revealed no weakness. When examined two months later, the child had had no complaint of headache in the interim, and all reflexes were again active and equal.

During a period when poliomyelitis was epidemic, this child exhibited one of the cardinal symptoms, headache. She had diminished reflexes and a clear spinal fluid with increased cell count. At no time did she show paresis or paralysis of any muscle or muscle group. If the condition were diagnosed as a nonparalytic case of poliomyelitis, the diagnosis would have to rest on the following facts: (*a*) the occurrence of the illness during an epidemic period; (*b*) the presenting symptoms, which were only headache with fever at onset; (*c*) moderate diminution in deep and superficial reflexes, and (*d*) pleocytosis in the spinal fluid. Within the limitations of present knowledge, this type of case can at best be diagnosed only as probable nonparalytic poliomyelitis. As Sievers pointed out, many of the cases in 1947 resembled an acute meningoencephalitis, rather than encephalomyelitis.

Only a rapid method for identification of virus could positively indicate whether such cases were due to the poliomyelitis virus or to such other known viruses as that of St. Louis encephalitis or of equine encephalomyelitis, or to a different strain of poliomyelitis virus, or to a new and unknown virus. Until such a method is available, only a probable diagnosis can be made in these cases. This conclusion is in agreement with a statement in a recent publication of Hart E. Van Riper, medical director of the National Foundation for Infantile Paralysis, who included under major problems to be solved, first, the development of a simple laboratory test to identify, preferably, a single virus particle and, second, the development of a simple diagnostic laboratory test to indicate whether or not infection with the virus has taken place.

Regular Meeting, Jan. 20, 1948

A SYMPOSIUM ON CAUSES OF SUDDEN DEATH IN INFANTS AND YOUNG CHILDREN

Comparative Anatomy and Pathology of the Thymus. DR. ISAAC A. ABT.

The thymus is present in all higher mammals and vertebrates down to primitive fishes. In those fishes in which its existence is verified, the gland is situated dorsally in the branchial region; it is an elongated, much lobulated organ.

Amphibians, Reptiles, Birds and Mammals.—In adult amphibians the thymus lies behind and above the mandibular articulation. In the frog, the gland is behind the tympanic membrane under the depressor mandibular muscle. The thymus of the frog has essentially the structure of a lymphoid gland.

In reptiles, the thymus is variable in form and position. In lizards and snakes, it forms two masses on each side near the thyroid gland.

In birds, the thymus appears as a strand along the jugular veins, extending the length of the veins. The bands may be continuous in some birds; in others they occur as small nodules, like lymph nodes, about the size of lentils.

In mammals the thymus is situated, for the most part, in the thorax, but in some there is a cervical as well as a thoracic portion, while in the guinea pig the gland is located entirely in the neck.

Involution of the Thymus in Man and Animals.—In man the organ continues to grow up to the period of puberty and reaches its greatest development between the fourteenth and sixteenth years. From that time on it gradually decreases in weight and structural elements. Involution due to age occurs in all mammals and vertebrates. This is observed in fishes, birds and higher animals.

Accidental Involution.—The thymus is exquisitely sensitive to the food supply of the animal. Inanition causes a reduction in the size of the gland. The lymphocytes disappear first; Hassall's bodies are most resistant and disintegrate at a slower pace. In a number of animals the thymus is reduced in size and structure during hibernation. On adequate feeding the thymus of these winter sleepers is reconstituted.

Intercurrent disease is a potent factor in accidental involution. Alimentary disturbances with diarrhea and atrophy, as well as acute and chronic infection, may cause an appreciable decrease in the size of the thymus. In birds, cachexia, worm invasion, leukosis and tuberculosis may cause involution of the thymus. It may also be decreased in size and structure by application of roentgen radiation.

Extirpation of the Thymus.—In human beings removal of the thymus has been the treatment employed for enlargement of the gland, from whatever cause. The mortality of the operation has varied from 25 to 33 per cent. The patients who survived showed no manifestation of deterioration of organs, nor any defects in growth, development or body structure.

Extirpation in Other Animals.—Extirpation has been performed on frogs, chickens, young pigeons, rats and guinea pigs. When there was no surgical accident or infection, the operation did not affect the maturity, growth, appearance or behavior of the animals. Removal of the thymus from goats and dogs caused no constitutional effects.

Hassall's corpuscles are small, concentrically striated bodies, the remains of the epithelial tissue present in the early stages of development of the gland. Genuine Hassall's bodies are found in most mammals, but they are apparently absent from many birds and reptiles and absent or rare in amphibians and fishes.

Diseases of the Thymus.—Hemorrhage in the gland has been observed in the newborn. Abscesses may occur in septic infections of young infants. A large abscess of the thymus has been observed in association with a retropharyngeal abscess. Dubois abscesses may occur in cases of congenital syphilis, although they have been seen in cases in which no syphilitic infection had occurred.

Tumors.—Tumors of the blood, such as lymphosarcoma, leukemia and chloroma, are difficult to differentiate from hyperplasia of the thymus. Thymoma, according to some pathologists, should contain cells from both cortex and medulla.

It has not been shown that such a tumor really exists. Tuberculosis of the thymus in domestic fowls is not uncommon and has been observed in 30 per cent of already tuberculous chickens. Neoplasms with metastases have been reported in chickens.

Causes of Sudden Death in Infants. Dr. John A. Bigler, Highland Park, Ill.

I know of no topic in pediatrics concerning which there is more controversy and difference of opinion than the relation of the thymus gland to sudden death. Even its ability to produce symptoms is a highly controversial matter. This difference of opinion exists not only locally but also among various sections of the country. One encounters in the literature such statements as "the myth of the thymus," and "thymus superstition." A panel discussion at a meeting of the American Academy of Pediatrics several years ago ended with the statement that there is no relation between the size of the thymus and sudden death.

Carr said, "Unlike the development of knowledge regarding most organs and problems, there has been no definite trend of thought regarding the thymus gland . . . " (Carr, J. L.: *J. Pediat.* **27**:1, 1945). Little is known of its function. This thought bears significance even though there is experimental evidence of some relationship among the thymus, the adrenals, the gonads, the thyroid and the pituitary gland. Park and McClure expressed the view that a close relationship between the thymus and the heart might be possible. They also raised the question of sudden death due to cardiac failure as a result of faulty innervation. Carr referred to the experiments of Rowntree and associates, in which large doses of thyroid extract were given that depressed the blood pressure and caused sudden death through inducing auricular-ventricular heart block. The similarity of the pathologic findings in acute anaphylactic shock and in sudden death with a large thymus has been described.

With the present meager specific knowledge one should evaluate not only postmortem observations but also those symptoms which are sometimes present with an enlarged thymus. Also, one must evaluate the effect of roentgen therapy, its relief of such symptoms and the fact that sudden death rarely occurs in treated infants and children.

Stridor, asthmatic symptoms, attacks of cyanosis, syncope, dyspnea, dysphagia and shock, as well as vomiting, may be present in a variety of diseases. If, after complete investigation, nothing is discovered except a wide mediastinal shadow, one is justified in giving roentgen treatment to the area of the thymus. There is a surprisingly frequent disappearance of symptoms.

The occurrence of sudden death in an apparently healthy infant without previous warning symptoms is a shock to both parents and physician. There should be more than concern and sympathy when such a death occurs without gross or cytologic evidence of a cause other than a large thymus.

A baby 8 months of age had frequent short attacks of stridor and asthma-like wheezing, which were not relieved by any medication. A roentgenogram of the chest during the newborn period showed a wide mediastinal shadow, which was ignored. Reexamination by roentgenogram showed a slightly wider shadow. After roentgen therapy over this area prompt and permanent relief of symptoms was obtained as well as a normal mediastinum.

Roentgenograms of the chest of a 6 month old infant with stridor and a wheeze showed a wide mediastinal shadow. After roentgen treatment, the symptoms were relieved and the mediastinum appeared normal. The family moved to the eastern part of the country where another baby was born. They requested a roentgenogram of the chest of the new baby, but it was refused because "there

is no such thing as a thymus." At the age of 3 months the infant was found dead in its bed; there had been no previous abnormal signs or symptoms. On postmortem examination nothing was observed except a large thymus gland. The mother had a third child here in Chicago. Roentgenographic examination during the newborn period revealed a wide mediastinal shadow which returned to normal after roentgen therapy. The child has remained well.

An apparently healthy 7 year old boy, with no previous roentgenogram of the chest, was undergoing tonsillectomy. While the first tonsil was being removed, he stopped breathing and was revived with difficulty. The second tonsil was then removed, and he stopped breathing a second time, but this time he could not be revived. Postmortem examination revealed no pathologic lesion except a large thymus.

Another child was having his tonsils removed at Children's Memorial Hospital. He had been previously healthy, and no roentgenographic examination of his chest had been made. When the first tonsil was removed, he stopped breathing; he was revived with difficulty and sent back to his room. A roentgenogram of the chest revealed a wide mediastinal shadow. Roentgen treatments were given, and the mediastinum returned to normal. Six months later the other tonsil was removed without incident.

Two babies, 2 and 7 months of age, respectively, who had never had roentgenographic examinations of their chest, were put down for sleep in their buggies. Both had recently been examined and were apparently normal. A few hours later they were found dead by their mothers. Postmortem examination revealed nothing abnormal except large thymus glands.

A baby 3 months of age had a borderline enlargement of the thymus on examination during the newborn period which was not considered significant. The baby had been healthy and normal when put to bed after a feeding. Shortly after, it was found dead. Postmortem examination revealed nothing of pathologic importance except the thymus at the upper limits of normal and moderate generalized lymphoid hyperplasia.

I have seen reports of sudden death in healthy babies in which a large thymus was observed, but death was attributed to vegetative endocarditis of the newborn and to pneumonia. These infants had had no previous illnesses and were apparently well when death occurred. One may question the presence of vegetative endocarditis in such young infants. The question might also be raised of the development of pneumonia sufficient to cause death in a normal infant in one to two hours. Carr described lymphocytic infiltration of the bronchioles in normal-appearing infants who died suddenly of what he described as thymicoasthmaticus.

Nowhere have I been able to find evidence that roentgen treatments to the thymus area cause any harm. Neither in the literature nor on questioning a large number of pediatricians have I discovered any cases of sudden death with a large thymus which occurred after roentgen therapy to the thymic area. Carr reported 1 case in which a large thymus was observed; sudden death occurred a few hours after the second roentgen treatment. There is some evidence, then, that roentgen treatment over the thymus area may prevent sudden death unexplainable except for the presence of a large thymus gland. If death does not occur in those cases of wide mediastinal shadows treated with roentgen radiation, and if the roentgen treatment does no harm, it seems plausible, in the light of present knowledge, to make roentgenograms of all newborn infants, as well as of those older children who present suggestive symptoms. Then, if a wide mediastinal shadow is found, that patient may be given the benefit of even an apparent protection against sudden death due to the thymus.

Sudden Death Due to Neurologic Causes. Dr. Abraham Levinson.

Sudden or unexpected deaths of neurologic origin in infants and children are infrequent, but not rare. Sometimes death occurs momentarily, at other times in less than twenty-four hours. The etiologic factors vary with the age of the child. In the main, unexpected neurologic deaths may be divided into two groups, those in the newborn and those in older infants and children.

In the newborn, the most important neurologic cause of sudden death is intracranial hemorrhage. The quickest death occurs in hemorrhage into the medulla, which fortunately is rare. I have seen only 2 such cases. Next in severity is hemorrhage into the ventricles of the brain; these patients moan and groan, have convulsions and usually die suddenly or unexpectedly. Fortunately, ventricular hemorrhage is also rare. However, any intracranial hemorrhage in the newborn may cause unexpected death. This is true of subarachnoid hemorrhage, particularly about the cerebellum, and of subdural hemorrhage if the amount of blood is large enough to produce increased intracranial pressure.

Cerebral edema and anoxia are among the rare causes of sudden death. The mechanism of death is the same as in hemorrhage-increased intracranial pressure. Kernicterus (nuclear) due to erythroblastosis may also cause sudden death. The latter, however, is due not to increased intracranial pressure, but to the toxic effect of nuclear jaundice.

Tumor of the brain is rare in the newborn, but when it does occur it may produce sudden death by herniation of the tumor or of the brain proper. Congenital hydrocephalus may cause sudden death, as may tuberous sclerosis and other malformations.

In older infants and children sudden death may be caused by a greater variety of neurologic diseases or accidents than in the newborn. The most dramatic and most unexpected cause of death in older infants and children is encephalitis, mainly hemorrhagic encephalitis. In 1935, Saphir and I described this disease and reported 6 cases (Levinson, A., and Saphir, O.: *Am. J. M. Sc.* **190**:42-51, 1935); since then I have witnessed 11 more. These patients become sick suddenly, some with and some without convulsions. The cerebrospinal fluid may be normal. They die within twenty-four hours, and on autopsy the brain shows multiple hemorrhages.

Any meningitis may cause sudden death. In infants under 1 year of age, meningitis may manifest few symptoms and signs, in spite of a well developed exudate. The fulminating type of meningococcic meningitis, often spoken of as Waterhouse-Friderichsen syndrome, produces death in a few hours. Death in these cases, however, is due to adrenal hemorrhage.

Bulbar poliomyelitis is a not infrequent cause of unexpected death in children. It is usually due to hemorrhage into the medulla. Of the less frequent causes are tumor and abscess of the brain and premature synostosis. Hemorrhage into the ventricles or into the subarachnoid or subdural spaces may cause sudden death in older children. Hemorrhage following whooping cough is not rare. Any convulsion may cause sudden death. Any abrupt release in intracranial pressure or introduction of substance intrathecally may cause sudden death.

Can anything be done to prevent such deaths? As a rule, no. In certain cases something may be done. In cases of convulsions it is most important to stop the convulsions as soon as possible. Recognition of meningitis and early treatment may prevent sudden death. In intracranial hemorrhage, complete rest is most important. Oxygen may be of some assistance. Sudden release and sudden increase of intracranial pressure should be avoided. Too much fluid must not be removed

in any case of meningitis, brain tumor or hydrocephalus, as the cortex, which is abnormally thin in hydrocephalus, may collapse. Shock must be avoided. On a whole, though, sudden death cannot be prevented. It is as mysterious as life itself.

Sudden Death in Infants. Dr. George F. Munns, Winnetka, Ill.

The phenomenon of sudden death among infants should command continued and more careful investigation by all physicians interested in the field of infant and child health. Careful history taking and postmortem examination are too often neglected by those who are in final attendance at these tragedies and, as a result, the real cause of death is never known.

I refer particularly to those infants found dead in their cribs, those who die without an observed previous warning sign or symptom of severe illness or grave abnormality. The physician usually arrives after the pulmotor squad; the infant is dead on his arrival and may have been so for minutes or even hours. Usually, the matter becomes a so-called coroner's case. A cursory or no postmortem examination is made and another death is added to that long, vague list of incidents classified as "death by strangulation," "death by suffocation" or "death by aspiration of extraneous material," or it is assigned to the old fashioned wastebasket "status thymicolymphaticus."

When postmortem examinations are done on these infants, the procedure is often limited to gross observation. Microscopic examination of tissues is often omitted and, because of this, the real cause or an important factor in the cause of death is never discovered.

In my own experience, 4 infants, all under 6 months of age, who were found dead in their cribs by mothers or attendants, well illustrate how easily one may be misled by gross autopsy observations alone. Two of these infants had had mild colds but appeared well and showed no symptoms which might have indicated severe infection. One had had a routine checkup in my office the day before his death. He revealed signs of only a mild infection of the upper respiratory tract, had no fever and did not appear ill. This infant was discovered dead in his crib the following morning, and in the interim the mother had noted nothing unusual about his behavior.

Postmortem examinations on each of these infants revealed a moderate degree of lymphoid hyperplasia, and in 3 of them the thymus gland was seen to be about twice the average normal weight for that age. Had the autopsy been limited to gross examination, each might have been recorded as a death resulting from status thymicolymphaticus. However, careful microscopic examination of sectioned tissues was done, and in each infant signs of widespread, early bronchopneumonia were observed.

One immediately wonders why these infants died so suddenly when thousands of other infants have what may appear to be similar severe infections, yet recover, or if death ensues it is postponed for a number of days after onset of the infection. It is easy and perhaps logical to say that the fatal cases were of infection of overwhelming virulence, but that explanation alone does not seem entirely adequate. The manner of death in each infant suggests the type of reaction often seen in severe anaphylactic shock. This is not a new idea. The theory has been discussed in several articles, notably by Waldbott in 1934 and by Carr in 1945. The history in each of these 4 instances revealed various strong allergic manifestations, such as asthma, hay fever, eczema and urticaria, among other members of the immediate family. In 4 other instances of sudden death in infants which came

to my attention through later attendance on the family, the history seemed almost identical with that of the previous 4 infants.

The pattern in these few cases cited, although they are too few in number to form definite conclusions, should at least lead one to give serious consideration to the thought that so-called thymic deaths in infancy are actually deaths identical with or similar to reactions to anaphylactic shock, and that this process is secondary to some type of infection. The relation of the thymus gland to the entire phenomenon still remains obscure in the light of present knowledge concerning that gland and its function. The fact that it is so often observed to be large, along with other general enlargement of the lymphoid system, suggests at least that it is intimately involved in the entire process.

The physician who has the misfortune to have one of these tragic and distressing cases in his practice should make every effort to see that a complete and careful autopsy is obtained.

In a community as large as Chicago and its environs, if such information could be gathered at some central agency, thereby affording a relatively large group of cases for analysis, we soon might have better insight into at least one type of sudden death among infants. Such a project might well be a part of the activities of the subcommittee on infant deaths of the Joint Maternal Welfare Committee of Cook County.

Sudden Death in Infants. DR. EDITH L. POTTER.

My personal experience is limited almost entirely to infants who die within ten days of birth, and the problem of sudden death is rarely encountered in this age group. The majority of deaths are the result of conditions operating prior to birth and are associated with anoxia, trauma or premature delivery, and rarely does an unexpected death occur.

My colleagues and I have seen only 2 unexpected deaths in the last five years. These infants appeared normal and no difficulties were anticipated with them. Both were discovered dead in their cribs a short time after last being observed. One died on the third day of life; autopsy revealed a diffuse pneumonia process in spite of the fact that the temperature had been normal and that no dyspnea, cyanosis or other disturbance had been evident. The other died on the sixth day; no explanatory lesion was observed on postmortem examination. All organs were moderately congested, and there were a few scattered ecchymotic hemorrhages in the tissues around the great vessels coming from the heart. The lungs were well aerated and showed no evidence of pneumonia. Cultures of the blood were negative for pathogens. The thymus was of normal size.

Previous reports have shown that in older infants the principal lesions encountered at autopsy are in the lungs, and that most sudden deaths are associated with unrecognized infections.

The thymus gland has held a unique place in medical literature as a supposed cause of sudden death. Largely because the function of the thymus is little known, even today abnormality of the gland is usually indicated when no other explanation for sudden death is available. In the opinion of investigators, death is brought about in two possible ways: either by direct compression of the trachea or by the contribution of tracheal compression to the syndrome of status thymicolymphaticus. As long as it remains a gland of mystery with no specific known function it will doubtless continue to be indicted as related to unexpected death.

The gland is composed largely of lymphocytes. Its size and structure vary as other lymphoid areas vary. Disease processes of almost any variety cause a de-

crease in the size of the thymus, particularly a disease associated with loss of weight.

Two specific conditions in the newborn infant which always show a divergence from the normal pattern of the gland are erythroblastosis fetalis and anencephaly. In erythroblastosis the thymus, in common with other lymphoid tissue, shows hypoplasia; lymph nodes are small, malpighian corpuscles in the spleen are reduced in size or absent and the thymus weighs only a few grams. Anencephalic monsters, on the other hand, have disproportionately large thymic glands. The histologic pattern of such glands reveals a generalized widening of the cortical zones, owing to the presence of an increased number of lymphocytes. The adrenal glands of anencephalic monsters are always hypoplastic. They fail to possess the wide inner cortical zone that is characteristic of the newborn but which rapidly degenerates and disappears after birth. It seems probable that a relation between these two conditions exists.

As was mentioned previously, the weight of the thymus gland varies greatly. Many studies have shown that the apparently well child who dies suddenly has a larger thymus than the child who has been ailing for a time before death. Most physicians are surprised at the size of the thymus gland at their first postmortem examinations on a newborn infant or on one who has not had an infection or a protracted illness, just as all students are surprised when at postmortem examination they first see the ductus arteriosus in an infant a few hours old.

I should like to show a lantern slide of the anterior aspect of the mediastinum of an infant who died of intracranial injury a few hours after birth. This slide shows the normal picture in the newborn infant. The thymus gland lies over the heart and great vessels. The innominate vein usually runs through the posterior portion and, from the location, one would expect some circulatory embarrassment before sufficient pressure could be created to compress the trachea.

Several years ago we were interested in tabulating weights of organs to determine a normal standard. We obtained thymic weights on 1,044 infants who died during labor or within twenty-four hours of birth. Infants with malformations or known infections were excluded, and an attempt was made to include only those who died because of factors extrinsic to the infant itself.

From the accompanying slide it will be noted that the size of the organ gradually increases during intrauterine life and that the mean weight in the average-sized infant at birth is 16 Gm. This varies greatly, however, and the quartile and class limits show a wide range.

Since the University of Chicago Clinics opened in 1929 my colleagues and I have observed more than 400,000 patients, of whom more than 50,000 have been newborn infants and an approximately equal number have been older infants and children. Among these 100,000 children, roentgen treatments have been given to the thymus only eleven times, and only twice in the last fourteen years. In both cases the treatments were given at the request of physicians not on our staff. The condition of 1 infant, aged 5 months, was diagnosed as enlarged thymus causing tracheal compression with some stridor. The condition was not affected by roentgen treatment, but several months later the stridor gradually disappeared. The other infant, 14 months of age, was examined roentgenographically because of some respiratory difficulty encountered during an attempted repair of the palate. A wide mediastinal shadow was present and the thymic area was treated with roentgen radiation. No subsequent films were made.

We see occasional children with wide shadows in the upper mediastinal region, but a great deal of the apparent width is the result of the fact that the infants are lying down and the structures are much flatter than in the upright position.

The infants are also usually crying. A great difference can be demonstrated in the width of the upper mediastinum in a child who is quiet and in one who is crying. I have reviewed the films of those infants who were given therapy, and of a few more with unusually wide thymic shadows. In none of those treated is there adequate evidence of retrogression in size of the thymus following treatment. One infant with a shadow identical to those considered typical of thymic enlargement died, and the thymus was discovered spread out over a mediastinal lymphangioma —a cystic hygroma.

If pressure on the trachea or other disturbances leading to death were caused by the thymus, they should at least occasionally be seen in infants who are under observation, not just in those who are unexpectedly found dead.

About a year ago I had an opportunity to see a most interesting document. A book on the market entitled "The Infant's First Seven Years" has a request in the foreword that it be sent to a hospital for study when completed. This volume was returned with an addendum several times the size of the original book which had been collected by these particular parents. They had had a child who died under anesthesia at about 2 years of age, during tonsillectomy. An autopsy had been performed, and the certificate stated "status thymicolymphaticus." They were so grief stricken that they started collecting data on the thymus. They had reprints, articles from lay journals and Sunday supplements and letters from many outstanding authorities in pediatrics, surgery, roentgenology and other fields. Almost all the letters were to the same effect—although there was no proof that abnormality of the thymus gland could cause sudden death, it might be possible. One or two said that the child probably would not have died had it received roentgen treatments to the thymus before surgical intervention. They made several attempts to get someone to introduce a bill into Congress making roentgenographic examination of the thymus mandatory before surgical treatment was undertaken on a child. Only a few months ago a physician asked my opinion on his proposed attempt to have a bill passed in his state legislature demanding that a roentgenogram of the chest be made of every newborn infant to determine the size of the thymus and that if the gland was "enlarged" treatment be given.

In summary, in the young infant indictment of the thymus as a cause of unexpected death does not seem justified. If there is an actual tumor composed of lymphoid tissue, this may be possible, but the roentgenographic and pathologic evidence is so meager in most instances that only the lack of another cause of death makes one willing to accept such flimsy evidence. In older children, if some peculiarity of constitution leads to unexpected or sudden death, there is no reason to relate this specifically to the thymus. The thymic hoax dies hard and, until someone finds a specific function for the thymus, it may well be with us always.

Sudden and Unexpected Natural Death. Dr. S. M. Rabson, Fort Wayne, Ind.

Sudden and unexpected natural death in infants and young children encountered in medicolegal practice is found chiefly in boys and seldom beyond the age of 3 years. Of a group of 69 cases of sudden death in children under 5 years of age studied in detail, only 6 were older than 2 years of age. The contribution of Negroes goes far beyond their proportion of the population and is not regarded purely as a biologically racial phenomenon.

Disease of the respiratory tract is the great leveler, accounting for almost 80 per cent of the unexpected deaths in infants. Caution may be necessary, however, lest undue weight be placed on the role of anatomically minor inflammatory changes in the breathing apparatus.

There is a group of sudden and unexpected natural deaths in which the present usual means of investigation fail to uncover the cause. Such cases are encountered in apparently normal infants, usually between the ages of 4 and 8 months.

The role of the thymus in the production of unexpected death has yet to be clarified. The variability of its weight, especially in the newborn, makes an evaluation of the lethal role of size alone exceptionally difficult. A single instance of a thymus sufficiently enlarged to press on the upper airway is recorded, but there was no evidence to indicate why the child died when it did, and not sooner or later.

A plea is made for complete necropsy, including bacteriologic and chemical examination, for judicious evaluation of postmortem observations and correlation with the clinical history and for a willingness to admit inability to fix the cause of death.

DISCUSSION

DR. ISAAC A. ABT: I should like to ask Dr. Rabson what caused the thymus to be so large in the case mentioned. Is there such a thing as thymitis?

DR. S. M. RABSON, Fort Wayne, Ind.: I do not know what caused the enlargement; I agree that the thymus was large. With Dr. Potter's figure of 35 Gm. as the upper limit of normal, a gland of 77 Gm. obviously would be enlarged. In the boy who died of pulmonary embolism the thymus weighed 50 Gm.

As for the question about thymitis, Dr. Abt said that the cells of the thymus are regarded as lymphocytes. I find it difficult to evaluate the status of inflammation in an organ normally full of lymphocytes without other evidence of inflammation. In "accidental" involution, however, the degenerating Hassall's bodies are overrun by neutrophilic leukocytes, usually regarded as the cells of the acute inflammatory process.

DR. EDITH L. POTTER: Dr. Abt gave an excellent discussion of the thymus from the developmental point of view, but I should like to know something of his view of the thymus as a cause of accidental death, and whether status thymicolymphaticus should be considered an entity.

DR. ISAAC A. ABT: The function and structure of the thymus, as well as its role in causation of disease and sudden death, have been under study and discussion for a long time. In 1614, Felix Platter first reported death from hypertrophy of the thymus in an infant. The function of the thymus was first investigated by Alexander Friedleben in 1858. He extirpated the gland without causing disturbance of function in animals who survived operation. Status thymicolymphaticus was first sketched out by Richard Bright in 1838 and more fully described by Arnold Paltauf in 1889. Paltauf studied several men who had met sudden death while swimming, and he ascribed the cause to enlarged thymus and lymphatic constitution.

About the beginning of this century, Dr. Albert P. Ohlmacher, who had taught pathology in Chicago, but later became director of the pathologic laboratory at the Ohio Hospital for Epileptics, at Gallipolis, Ohio, reported that autopsies on patients who died suddenly at the institution frequently showed persistent thymus with enlarged lymph nodes and, particularly, enlarged prominent rugae of the mucous membrane of the stomach. These specimens were well preserved and were shown at medical exhibits and meetings. The specimens were impressive, but the relationship between lymphatic hyperplasia and sudden death was not clarified. There was growing dissent about the significance of status thymicolymphaticus. Lubarsch in 1912 thought that the anatomic conditions present in status lym-

phaticus may be observed in many acute and chronic disorders, such as measles, scarlet fever, syphilis, tuberculosis and many other infections. He reported supposed thymic death in a child a closer investigation of whom showed a streptococcic sepsis.

Finkelstein wrote that he saw no case of so-called thymic asthma which was not demonstrated to be due to some cause other than enlargement of the thymus when careful examination was made.

There is no proof that the thymus is a gland of internal secretion; indeed, all the evidence is against such a view. Nevertheless, the thymus should not be considered a superfluous organ. The fact that it is present during young life, that it occurs in most mammals and many vertebrates, leads one to think that it has a place in animal function. Sudden death may occur in overwhelming infections such as scarlet fever or epidemic meningitis.

In answer to Dr. Potter's question about the thymus as a cause of sudden death, or whether status thymicolymphaticus is an entity, I should say, in addition to what I have already mentioned, that skepticism about the role of the thymus in producing sudden death is increasing; at least there is no proof as to the mechanism which might cause it.

Virchow once said that every physiologic type has its pathologic prototype. The difficulty in the case of the thymus is that there is no inkling as to its function. Perhaps future study will bring more light.

QUESTION: I should like to ask Dr. Bigler how many infants were breast fed.

DR. JOHN A. BIGLER, Highland Park, Ill.: I think none were completely breast fed. I do not know whether the thymus alone can be the cause of death or whether it is associated with some other disturbance of function. These sudden deaths were not recorded in children for whom a roentgenogram had been taken and who were given roentgen therapy when a wide mediastinal shadow was present. It has always occurred in children in whom the wide shadow has been ignored or who were not examined roentgenographically.

I should like to ask what the experience of this audience has been in relation to cases of death with a large thymus. Do any of you know of deaths due to a large thymus that occurred after roentgen therapy to the mediastinal area? I have discovered no such cases reported in the literature. These sudden deaths do not occur in hospitals because the infants are not ill. I think that if there is any possibility that the thymus, directly or indirectly, may be the cause of sudden death in the present state of knowledge patients should be given the benefit of the doubt by a roentgenogram of the chest and roentgen therapy whenever a suggestion of a large thymus is present.

DR. S. M. RABSON, Fort Wayne, Ind.: About fifteen years ago George Streeter gave the Harvey Lecture on "Fetal Pathology." At the end of his discourse he projected on the screen a photograph of two human eggs and pointed out that there were distinct gross differences between the eggs. He then remarked that the individual might be said to grow up to the man he was because of the kind of egg he had been.

QUESTION: What is the earliest age at which rupture of an aneurysm of the circles of Willis was observed?

DR. S. M. RABSON, Fort Wayne, Ind.: Dr. M. Helpern and I published a study on that subject (Rabson, S. M., and Helpern, M.: *Am. Heart J.* **35**:635-642 [April] 1948). I cannot recall the exact data but it is my recollection that rupture of such an aneurysm was not seen in a child under 10 years of age. I think

the earliest instance seen was at puberty. Most cases of spontaneous subarachnoid hemorrhage occur in young adults and in persons of middle age.

DR. ABRAHAM LEVINSON: Apropos of Dr. Rabson's remarks, is there not a constitutional factor which predisposes one child to death and not another? Why does one child have pneumonia without convulsions, while another will have convulsions? Why does one child have encephalitis and die immediately, while another does not? I have thought that this constitutional factor which predisposes a child to severe disease or to sudden death may be anaphylaxis. Many years ago, the factor was stated to be hypoplasia of the arteries, or hyperplasia of the lymphatic system. However, why do 99 per cent of children recover from a disease, while the other 1 per cent die immediately? My thought is that it is not anaphylaxis, nor hypoplasia of blood vessels or lymphatics, but a distinct constitutional factor.

AMERICAN ACADEMY OF PEDIATRICS

J. I. Durand, M.D., *President*

National Meeting, Pittsburgh, Feb. 24-27, 1947

ROUND TABLE DISCUSSION

Maintenance and Care of Strong Feet in Infancy and Childhood. DR. LEE BIVINGS, Atlanta, Ga.

This report is a culmination of a study of the feet of growing children begun in 1932. Previous reports (Bivings, L.: AM. J. DIS. CHILD. **46**:1050 [Nov.] 1932; **49**:1161 [May] 1935; **49**:1164 [May] 1935; **56**:775 [Oct.] 1938; *J. Pediat.* **18**: 417 [March] 1941) discussed methods of recording heelprints and the making of corrective shoes and presented material gathered from work in health centers, clinics and schools. The present group was made up entirely of private patients who were followed from early infancy to the tenth or twelfth year of life; the study covers approximately 1,300 case histories.

To review briefly the anatomy of the foot, in the ankle there is a hinge joint made up of the lower ends of the tibia and fibula. Into this joint fits the articular surface of the astragalus which transmits weight through the os calcis in the heel and the scaphoid, cuneiform, cuboid and metatarsal bones to the forefoot. Schwartz and Heath (*Physiotherapy Rev.* **16**:46 [March-April] 1936) showed the human foot to be structurally weak because of two factors: the line of weight comes down through the center of the tibia and is about 1.5 cm. medial to the center of the os calcis where it touches the ground, and the rounded under surface of the os calcis tends also to produce pronation. Therefore, the growing foot of the young child has great difficulty in assuming and maintaining proper balance. The hingelike ankle joint prevents much twisting of the foot on the ankle but does allow pronation, which is inevitably followed by abduction of the forefoot on the heel. These are the cardinal weaknesses which must be combated during the period beginning with the first walking step and extending to the fifth or sixth year. This period will hereafter be referred to as the "transition period."

The muscles of importance are the anterior and posterior tibialis, which are involved chiefly in supination and maintenance of foot balance, and the flexor hallucis longus, which maintains foot balance during the raising of the heel and assists in adducting and supinating the foot. The gastrocnemius and soleus do

most of the work in propulsion but are not involved in the maintenance of proper balance except when shortening of the tendon occurs. Strengthening of the leg muscles by exercise should be helpful in restoring foot balance in children, but from a practical standpoint the necessity of prolonged exercises under adequate supervision makes this solution to the problem too difficult of attainment.

Since children must walk on hard surfaces, properly fitted and properly modified shoes seem the most practical method of attaining strong feet in late childhood and adult life.

The desideratum of such a shoe is one which holds the foot in a normal position of slight adduction and supination. It must fit the heel snugly, contain a heavy counter to prevent pronation within the shoe, allow plenty of room for the forefoot so that the great toe may be straight and parallel with the long axis of the heel and be strong enough that the foot will not break down the inside of the shoe. It should be a combination last, and the width of the heel to the forefoot should be in a ratio of 1 to 1½, or 1 to 2. Flexibility of the sole under the ball of the foot is all that is necessary. Too much flexibility destroys the ability of the shoe to withstand the constant tendency of the foot to pronate and abduct. There are several shoes commercially available which meet these specifications. However, some manufacturers produce a cheaper shoe under the same trade name which is of the stitched-down type and has practically no shape, fit or value insofar as support of the foot is concerned.

In the group to be presented in detail in this report, properly fitted shoes were my chief resource in an attempt to get the children through the transition period with strong feet. The results seem to indicate that the method was successful in this instance. Since it was not possible to include a control group showing what would have happened without the help of the shoes, one must admit that any conclusions as to proof of the value of such shoes are lacking. Although I did not set out to prove anything, but to report the results of a long period of observation on many growing feet, many useful facts have come to light.

Charts 1 and 2 show graphically that there was a sharp increase in weakness of the feet when they began to bear weight, with a rapid recovery to good foot balance in a high percentage by the time of the fifth, sixth and seventh years of life in the group of private patients presented in this study. It should be remembered that every opportunity to have good feet was given the members of this group. All wore the best of shoes, and the majority wore wedges under the heels to correct pronation during the transition period. Those with severer types of weak feet wore corrective shoes. It is doubtful, therefore, that a similar group taken from the population as a whole would show such a high degree of good foot balance.

It is a striking fact that of the group of prewalking infants (648), 92.6 per cent had definitely strong feet; 1.8 per cent had mild clubbing, 5.6 per cent were borderline and only 1 per cent had definitely weak feet. These observations seem to refute the old idea that all infants have flat feet. The arch of the foot is well formed and visible in the vast majority at birth.

In the prewalking group of 600 infants with strong feet (92.6 per cent of the total), an attempt was made to subdivide them as to type of foot in order to see which persisted into the older age groups. It was observed that pes cavus (unusually high arch) increased from 6 per cent to 30.3 per cent in the older groups. Mild pes cavus, evident in 47 per cent of the prewalking infants disappeared in the general classification of normal in the older groups. Strong feet rose from 35 per cent in the prewalking group to 41 per cent in the older groups. Since the

entire groups with normal or strong feet recovered to approximately the same percentage (about 92) by the time of the fifth, sixth and seventh years of life, it would seem that the persistence of the pes cavus type could be predicted most accurately of any of the normal subgroupings.

ECONOMIC GROUPS

In a previous paper I showed that there seems to be a definite increase in weak feet as the economic scale declines. This study in 1946 of approximately

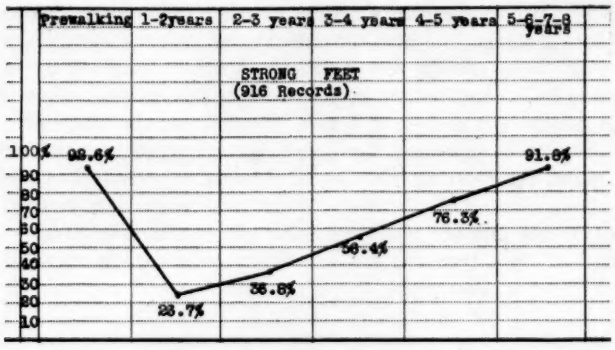

Chart 1.—Graph showing percentage of strong feet by age group in a series of private patients.

1,100 private patients further substantiates that impression. The groups are not accurately comparable, since this latest study begins with an earlier age and carries through to a later one, but the same trend is evident.

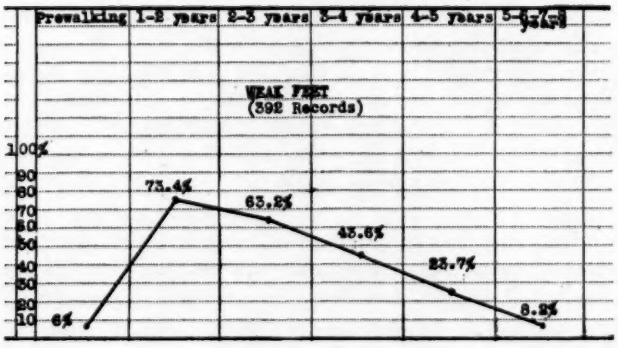

Chart 2.—Graph showing percentage of weak feet by age group in a series of private patients.

With the assumption that the economic levels of the private patients are above those of the former series, the figures for normal feet are as follows:

Private Patients	Patients of Low Middle Class	Poor Patients	Patients in Cotton Mill Clinic
67.7%	45%	36%	28%

The sharp differences in these figures are explained partially by the fact that the previous studies did not extend into the years in which natural recovery of weak feet takes place, as shown in the charts.

WEAK FEET

An analysis of mildly weak feet showed 5.6 per cent in the prewalking group, a sharp increase to 41.9 per cent in the first year of walking with a decline to 30, 27 and 18 per cent in subsequent years and falling to 1 per cent in the group 5, 6 and 7 years of age.

In contrast, analysis showed only 1 per cent with weak feet in the prewalking group, and 31, 32, 17.6 and 5.2 per cent in subsequent years, with a rise to 7.3 per cent in the fifth, sixth and seventh year group. Recovery in this group seems much less complete, and it is probable that from this group come most of the extremely weak feet of later life.

MILD CLUB FEET

In the large prewalking group (648 children), there were 12 children (1.8 per cent) with mild clubbing of the feet. It was possible to follow about half of them long enough to determine that mere weight bearing was all the help they needed. In 2 instances there was too much pronation by the fifth, sixth and seventh years.

My opinions in the following discussion are based on a study of more than 2,700 patients, both clinic and private, many of whom have been watched over a period of fifteen years. My opinions are still not fixed but subject to change.

There are certain conclusions which seem fairly obvious from this study and certain impressions which cannot be proved scientifically because of the absence of control material in this 1946 study. Therefore, I shall state them separately.

CONCLUSIONS

1. Almost all babies are born with good feet. The arches are visible and demonstrable by footprinting.

2. There is a sharp rise in apparent weakness as soon as weight bearing begins. This weakness is followed by recovery, which is gradual to the fifth or sixth year.

3. Varying degrees of the "pes cavus type" are obvious in early infancy and persist into later childhood. The outcome of this type can be predicted more accurately than any other.

4. If the child is seen first during the transition period, it is difficult, if not impossible, to foretell the outcome or the kind of feet he or she will have except on a statistical basis.

IMPRESSIONS

1. Since the percentage of strong feet in this study of approximately 1,100 children was about the same at the end of the study as in the prewalking group, one might assume that proper foot care would promise the greatest chance of good feet in later life.

2. Shoes correctly built to assure normal foot development offer the most practical means of obtaining good feet in later life.

3. Since comparisons of economic levels show a declining percentage of good feet, it is probable that many complex factors, such as heredity, nutrition, disease and foot care, enter into the determination of the type or kind of feet any child shall have.

4. Mild abnormalities, such as pronation, "pigeon" or "ding" toes and mild clubbing, can and should be corrected by alterations in the shoes.

DISCUSSION

Dr. S. B. Grimes Jr., Baltimore: Should the soles of the first shoes when the baby begins to walk be soft or heavy and hard?

Dr. Lee Bivings, Atlanta, Ga.: The soles of the shoes should be heavy enough to resist the tendency of the feet to pronate and adbuct and yet flexible enough under the forefoot for bending in walking.

Dr. Herman Eisenberg, Washington, D. C.: It is advantageous to postpone the wearing of shoes for young children as long as possible?

Dr. Lee Bivings, Atlanta, Ga.: Properly shaped and properly fitted shoes should be worn when weight bearing becomes continuous during waking hours.

Dr. G. D. Johnson, Spartanburg, S. C.: May the child from 2 to 5 years of age go barefoot?

Dr. Lee Bivings, Atlanta, Ga.: If the child is past the transition period and you are sure he has good strong feet, it is all right. Generally, I think it is wise for the child to wear shoes at all times when on his feet, from the period of first walking until the third or fourth year.

Dr. Florence A. Browne, Hartford, Conn.: At what age do you put heels on the shoes?

Dr. Lee Bivings, Atlanta, Ga.: I think it does not matter too much, but they are usually found on the shoes at about the third or fourth year.

Dr. A. B. Hoyer, Cincinnati: What is your feeling about moccasin-type shoes and sandals?

Dr. Lee Bivings, Atlanta, Ga.: Such shoes offer no support to the feet. After the transition period when the type of foot becomes apparent one can be governed by that. The same rule should be applied as to going barefoot.

Dr. Dorothy V. Whipple, Arlington, Va.: What about Keds?

Dr. Lee Bivings, Atlanta, Ga.: The same rule should be applied as for moccasins and sandals and going barefoot. For brief periods they are permissible, but for long wear, even with good feet, they are questionable.

Dr. A. B. Hoyer, Cincinnati: What is your feeting about semiflexible soles?

Dr. Lee Bivings, Atlanta, Ga.: Strong soles are necessary if shoes are to maintain their function of holding the feet in normal position. Flexibility under the forefoot is present in practically all shoes and seems sufficient.

Dr. D. R. Davis, Emporia, Kan.: What do you think about the shoe in which the sole comes up behind the heel?

Dr. Lee Bivings, Atlanta, Ga.: I am not familiar with that type of shoe but cannot see that it would have any particular virtue.

Dr. E. G. Lawler, Chicago: Should Jumping Jack shoes be used?

DR. LEE BIVINGS, Atlanta, Ga.: I presume that is the shoe Dr. Davis mentioned. I am sorry I cannot elaborate on it.

DR. R. H. ILER, Brooklyn: What is the value of the shoe in which the counter extends through the arch, with a heel wedge?

DR. LEE BIVINGS, Atlanta, Ga.: I think it is of great value in keeping the shoe from breaking down or bridging across when the foot is extremely pronated. The wedge supinates the foot and is of great value.

DR. J. D. CRAIG, New York: At what age may children wear low shoes?

DR. LEE BIVINGS, Atlanta, Ga.: After the first year of walking, usually about the second birthday, proper foot balance may be maintained by an oxford which can be wedged if necessary. Strap shoes will not hold weak feet.

DR. J. L. KOHN, New York: Is a contrivance such as the Taylor Tot of any benefit in the development of the arches? Does its use retard walking?

DR. LEE BIVINGS, Atlanta, Ga.: If the child is allowed to push around in it, weight and pressure is applied along the inner margin of the feet and is definitely harmful. I believe its use does definitely retard walking.

DR. M. T. BRIGGS, Lynn, Mass.: Should one recommend shoes with a built-in arch?

DR. LEE BIVINGS, Atlanta, Ga.: If the shoes meet the requirements of narrow heel, broad forefoot and slightly adducted position, I see no objection to the built-in arch. If supporting structures under the arches are to be used, I believe something soft, such as sponge rubber or cork, should be used rather than metal.

DR. DOROTHY V. WHIPPLE, Arlington, Va.: What is your opinion of foot exercises?

DR. LEE BIVINGS, Atlanta, Ga.: I think they are helpful if they can be faithfully followed over a long period under expert guidance. I find them of no great practical value.

DR. R. H. ILER, Brooklyn: Is an inner sole wedge together with an inner heel wedge of value in the treatment of knock knee with pronation?

DR. LEE BIVINGS, Atlanta, Ga.: Knock knee is part and parcel of pronation, and correction of pronation will correct the knock knee. I have found the heel wedge sufficient—the sole wedge seems to make the shoe less flexible. The correction seems most necessary under the heel and not under the forefoot.

DR. C. C. STEWART JR., Hanover, N. H.: Is there any correlation between knock knee and weak feet?

DR. LEE BIVINGS, Atlanta, Ga.: Yes, as stated previously, the cause is the same. Knock knee is almost inevitable with pronated feet. Correction of the pronation will eventually correct the knock knee.

DR. M. M. FLIESS, Clifton Forge, Va.: If knock knee is severe would braces be necessary? Will proper shoes prevent knock knee?

DR. LEE BIVINGS, Atlanta, Ga.: I have never seen the condition severe enough to require braces. Prevention and correction of pronation will prevent and correct knock knee.

DR. M. L. STEIN, Great Neck, N. Y.: Is it of any significance when feet are held in apparent abduction during early infancy?

DR. LEE BIVINGS, Atlanta, Ga.: I do not think so.

DR. FLORENCE A. BROWNE, Hartford, Conn.: Does the sleeping position of the infant have anything to do with foot development?

DR. LEE BIVINGS, Atlanta, Ga.: I do not think so.

DR. I. MILLER, Brooklyn: Please suggest treatment for pes cavus in early infancy.

DR. LEE BIVINGS, Atlanta, Ga.: I used the term pes cavus rather loosely in this discussion to mean an unusually high arch. Such feet are often unusually strong and would need no treatment at all unless pronation is so severe as to require supination by wedging as the child grows older. Real pes cavus is an orthopedic problem requiring treatment by a qualified orthopedist.

DR. H. E. BLAIR, Hagerstown, Md.: What is the treatment of pes cavus in older children?

DR. LEE BIVINGS, Atlanta, Ga.: With a condition meeting this qualified definition it is necessary only to correct the resulting pronation with a supinating wedge under the inner heel. It sometimes is necessary for such wedges to be worn indefinitely. The height of the wedge will vary with the size of the shoe, from one-eighth to one-quarter inch (0.3 to 0.6 cm.).

DR. R. B. SCOTT, Washington, D. C.: Are any abnormalities associated with pes cavus?

DR. LEE BIVINGS, Atlanta, Ga.: None that I know of, except knock knee.

DR. E. D. ATLEE, Ardmore, Pa.: Does reversing the shoes help in correcting pigeon toes?

DR. LEE BIVINGS, Atlanta, Ga.: I should think such management would definitely tend to increase the abduction and pronation; I should prefer to wedge the outer toe area of the shoes and, if pronation is extreme, to use also a wedge under the heel. Pigeon toes is a compensatory mechanism, and the only fault in allowing it to continue is that such a habit of walking will often persist into later life, which is particularly objectionable in girls.

DR. D. A. WEIR, Mansfield, Ohio: How about the use of a wedge on the inner side of the toe?

DR. LEE BIVINGS, Atlanta, Ga.: I should think that would exaggerate the existing condition of pigeon toes, but I have not seen it tried. An outer wedge under the fifth toe would seem more logical.

DR. J. L. KOHN, New York: Please discuss the use of flexible and inflexible plates for the treatment of weak feet and other deformities.

DR. LEE BIVINGS, Atlanta, Ga.: I have not used plates of any kind. If they are to be used, one should first see that the shoes meet the requirements, then further support might be obtained by the use of soft flexible pads under the arches. Difficulties with the transverse arch seem uncommon in children, and I have had no experience in their management. End results in the management of very weak feet in children have not been too satisfactory with me. Most of my efforts have been directed at prophylaxis and maintenance of strong feet, rather than toward correction of very weak feet. The principle involved is the correction of extreme pronation and abduction. This can be partially accomplished by the use of "swung" shoes and an added wedge under the heel (inner). The principle involved in the use of plates has never seemed too logical to me.

Abstracts from Current Literature

Newborn

MATERNAL MORTALITY, STILLBIRTHS AND NATAL MORTALITY IN BUENOS AIRES (1937 TO 1941). DELIO AGUILAR GIRALDES, Arch. argent. de pediat. **25**:313 (May) 1946.

The patients included in this study are divided into three groups: those from the capital, those from the provinces and territories and those whose address is unknown. In each group are considered both hospitalized and nonhospitalized patients.

Of 225,945 babies, 217,840 were born alive. For every 100 born alive, 5.6 babies died, (3.71 per cent were stillborn and 1.7 per cent died at birth). Of the mothers, 422 died (1.93 per cent of the total deaths). The number of registered maternal deaths in the hospitals was higher than that outside the hospitals.

ROJAS, Boston.

Acute Contagious Diseases

MYOCARDIAL COMPLICATIONS OF CUTANEOUS DIPHTHERIA. C. F. KAY and C. S. LIVINGOOD, Am. Heart J. **31**:744 (June) 1946.

Of 140 soldiers with cutaneous diphtheria, myocarditis appeared in 4 patients. One of these died. For 3 other patients the diagnosis of myocarditis was considered probable. The cardiac complications occurred from the fourth to the seventh week after the onset of cutaneous lesions and were found only in patients whose cutaneous diphtheria was severe. Of the 3 patients with myocarditis who survived, neuritis occurred in all.

GIBSON, Chicago.

DIPHTHERIA CARRIERS TREATED WITH PENICILLIN. R. A. KOCHER and W. J. SIEMSEN, Ann. Int. Med. **24**:883 (May) 1946.

Penicillin is proved to be ineffective in the treatment of diphtheria carriers. The drug was given by intramuscular injection and by mouth.

READING, Galveston, Texas.

EPIDEMIC POLIOMYELITIS. JOSEPH A. LUHAN, Arch. Path. **42**:245 (Sept.) 1946.

The author presents a topographic study of the brain in 13 fatal cases of poliomyelitis with bulbar involvement, using microscopic sections from representative cortical areas. The chief observations were: slight to prominent interstitial cellular infiltration in the gigantocellular motor area in 12 of the 13 cases; absence of involvement of the olfactory bulbs and tracts in the 5 cases in which they were available for study, and in 5 cases in which sufficient spinal cord was available the newest process was observed in the lumbar or lumbosacral parts of the cord. The discussion includes a brief review of previous reports concerning the involvement of various parts of the cerebral cortex in poliomyelitis.

GEREN, St. Louis.

POLIOMYELITIS: A REVIEW OF ITS EPIDEMIOLOGY WITH ESPECIAL CONSIDERATION OF THE AUTARCEOLOGICAL CONCEPT OF IMMUNITY. ALEX G. BERGER, Minnesota Med. **29**:761 (Aug.) 1946.

The author presents a review of the epidemiology of poliomyelitis. An attempt at evaluation is also made, and certain observations and suggestions should be considered. First of all, it appears that the etiologic agent of poliomyelitis is a filtrable virus, which consists of many different strains. It is widespread throughout the world and may move from person to person by droplet infection. Other vectors, such as insects, may aid in its mechanical transmission.

Most persons respond to virus contact by experiencing a mild or subclinical infection, but a few have paralysis, which may almost be looked on as a complication. The factors determining the occurrence of paralysis seem to be primarily in the nonspecific phase of host immunity based on hereditary and constitutional-physiologic variations from the normal. The endocrine glands and vitamins may be intimately associated with the production of the physiologic susceptibility to the effects of the virus.

STOESSER, Minneapolis.

PREVENTION OF STREPTOCOCCIC COMPLICATIONS OF SCARLET FEVER BY EARLY USE OF SULFONAMIDE COMPOUNDS. G. SANSONE, Rivi. di clin. pediat. **41**:234 (April) 1943.

In the Ospedale Civile di Sampierdarena in Genoa, Italy, the use of sulfanilamide preparations caused the streptococcic complications of scarlet fever to decrease from 27.5 per cent (with 7.5 per cent deaths) prior to 1935 to 1.5 per cent (with no deaths) since that date. The toxic manifestations in the early stages of the disease were not affected by the drug. Sansone concludes that scarlet fever is caused by a combination of the hemolytic streptococcus and an unknown filtrable virus.

HIGGINS, Boston.

WATERHOUSE-FRIDERICHSEN'S SYNDROME: REPORT OF A CASE WITH RECOVERY BENGT JONSSON, Ann. Pædiat. **167**:77 (Aug.) 1946.

The author describes in detail a case of Waterhouse-Friderichsen's syndrome in a boy, 9 years of age, who was treated successfully. A brief discussion on the signs and symptoms of the disease and on suitable treatment is appended .

FROM THE AUTHOR'S SUMMARY.

Acute Infectious Diseases

THE EFFECT OF SALICYLATES ON ACUTE RHEUMATIC FEVER. H. A. WARREN, C. S. HIGLEY and F. O. COOMBS, Am. Heart J. **32**:311 (Sept.) 1946.

The painstaking observations of the authors are important contributions to the problem of the effectiveness of large doses of salicylates in treatment of acute rheumatic fever. They found that daily doses of 10 to 16 Gm. of sodium salicylate reduced the temperature more quickly than small doses, and that the large doses offered an advantage in the treatment of acute rheumatic pericarditis.

Large doses of sodium salicylate did not, in the authors' experience, prevent the development of cardiac damage or the progression of preexisting heart disease; they did not shorten the period of rheumatic activity or prevent the development of polycyclic attacks.

GIBSON, Chicago.

THERAPEUTIC TRIAL OF PENICILLIN IN TETANUS. LEON LEWIS, Ann. Int. Med. **25**:903 (Dec.) 1946.

Fifteen patients with tetanus were treated with adequate doses of penicillin given intramuscularly. In no instance was the course of the disease altered. Dr. Lewis concluded that penicillin is not an effective agent in the treatment of tetanus.

READING, Galveston, Texas.

BRUCELLOSIS—CLINICAL ASPECTS. WENDELL H. HALL, Minnesota Med. **29**: 679 (July) 1946.

Brucellosis is on the increase in certain parts of the country. The author reviews the clinical aspects of this disease. He states that no treatment has been developed which is specific and thoroughly reliable. In his experience, the best results are obtained by confining the patient to bed and giving 1 Gm. of sulfadiazine every four hours by mouth for two to three weeks. The value of sulfonamide therapy is difficult to assess. In chronic cases of the disease no special therapy has been found to be effective.

STOESSER, Minneapolis.

VACCINE THERAPY IN TYPHOID FEVER. FILIPPO MULE, Pediatria **54**:395, 1946.

The blood serum of patients with typhoid fever under the stimulus of curative vaccine acquires a more or less pronounced bacteriostatic and bacteriolitic power which probably has a great influence on the process of recovery.

FROM THE AUTHOR'S SUMMARY.

THE ALKALI RESERVE AND CHLOREMIA IN INTERNAL LEISHMANIASIS. ARMANDO CARNEVALE, Pediatria **54**:606, 1946.

The author has studied the acid-base equilibrium in a group of 10 children with visceral leishmaniasis, determining the alkali reserve and the degree of chloremia. During these researches he observed in the subjects, besides normal values for the alkali reserve, a chloroerythroplasmatic quotient higher than normal, which is the expression of an acidotic state similar to the one which develops in gaseous acidosis.

The author believes that such a variation in the chloroerythroplasmatic quotient is probably caused by more or less marked decrease of the hemoglobin observed in all the subjects examined and by the altered protein equilibrium of the serum.

FROM THE AUTHOR'S SUMMARY.

ACTION OF A SULFONAMIDE COMPOUND IN BENIGN TERTIAN MALARIA. M. SAINI, Riv. di clin. pediat. **40**:577 (Oct.) 1942.

In 3 children with tertian malaria the intravenous administration of sulfapyridine relieved the symptoms, led to the disappearance of the parasites from the blood and caused diminution in the size of the spleen.

HIGGINS, Boston.

NERVOUS COMPLICATIONS OF MALARIA IN CHILDREN. LUISA SOTO DEL REY, Rev. cubana pediat. **18**:733 (Nov.) 1946.

The nervous complications of malaria are relatively frequent in children. The most frequent are headaches, vomiting and convulsions. Two interesting cases of disturbance of personality and 1 of hemiplegia are presented. No true psychoses have been observed in children.

KEITH, Rochester, Minn.

MALARIA AND TUBERCULOSIS. SUSANA TEXIDO VAILLANT, Rev. cubana pediat. **18**:739 (Nov.) 1946.

Malaria and tuberculosis are frequently confused. Often they are found together, and then the prognosis is worse. In the zones where malaria is endemic, the index of tuberculinization is greater. The need for roentgenologic study of the chest in these areas is emphasized.

KEITH, Rochester, Minn.

Chronic Infectious Diseases

STREPTOMYCIN IN EXPERIMENTAL TUBERCULOSIS. WILLIAM H. FELDMAN, H. CORWIN HINSHAW and FRANK C. MANN, Am. Rev. Tuberc. **52**:269 (Oct.) 1945.

The striking effects of streptomycin in reversing potentially lethal tuberculosis in the highly susceptible guinea pig is amply demonstrated in this series of experiments. In brief, the animals were inoculated with human strains of tubercle bacilli forty-eight days before treatment was started. To determine the state of infection prior to treatment, biopsy of the liver was performed on all animals. After one hundred and sixty-six days of treatment, 70 per cent of the untreated animals were dead, as compared with 8 per cent of treated animals. Fifty-two per cent of the treated animals had no evidence of tuberculosis grossly or microscopically. Thirty-nine per cent of treated animals gave a negative reaction to tuberculin. Streptomycin in the dose used had a low toxicity for guinea pigs, and no deleterious effects were seen.

SMITH, Ogden, Utah.

THE CHICAGO PLAN OF TUBERCULOSIS CONTROL. FREDERICK TICE, Illinois M. J. **89**:280 (June) 1946.

The program of tuberculosis control which has been carried on in Chicago since 1931 is reported. The article is too detailed and comprehensive for adequate abstracting.

BARBOUR, Peoria, Ill.

THE ANTITUBERCULAR ACTIVITY OF ASPERGILLIC ACID AND ITS PROBABLE MODE OF ACTION. ANDRES GOTH, J. Lab. & Clin. Med. **30**:899 (Nov.) 1945.

Aspergillic acid, one of the antibiotics produced by Aspergillus flavus, was observed to inhibit in low concentrations human strains of Mycobacterium tuberculosis. Evidence is presented which indicates that the mode of action of aspergillic acid can be explained on the basis of interference with the utilization of iron by the tubercle bacillus.

WILKINSON, Galveston, Texas.

PENICILLIN COMBINED WITH FEVER THERAPY. ROBERT M. CRAIG, GEORGE X. SCHWEMLEIN and H. WORLEY KENDELL, J. Lab. & Clin. Med. **30**:1016 (Dec.) 1945.

This paper is a preliminary report of 20 cases of early syphilis treated with a combination penicillin and fever therapy. The authors conclude that it is safe to combine the two treatments in early syphilis. The use of 600,000 units of penicillin with three hours of fever at 106 F. (rectal) is inadequate, but the results of the use of 1,200,000 units of penicillin with three hours of fever at 106 F. (rectal) are encouraging enough to warrant further study of this type of therapy.

WILKINSON, Galveston, Texas.

EFFECTS ON THE BABY OF TREATMENT OF MATERNAL SYPHILIS. CESARE TORRICELLI, Pediatria **54**:591, 1946.

From the statistical data collected from the illegitimate population of the institute for children's welfare in Milan, the author noted a rise in the percentage of syphilitic mothers and children from 8.9 per cent, during 1940, to 11.1 per cent, during 1945.

After having examined 220 syphilitic mothers who were found ill before or at the time of their delivery, he concluded that the most dangerous influence on the product of conception is exercised in those cases of syphilis diagnosed and treated only during the last months of pregnancy. But even when the mother's syphilis is unknown, and therefore, at least apparently, characterized by a benign and silent development, the treponema is still able to display its pathogenic action on the product of conception in a moderate percentage of cases.

The author describes 6 cases of congenital syphilis in a group of mothers who became infected during the last sixty days before their delivery and whose children presented a different reaction to the infection. In the first 3 cases the children were healthy; in the fourth the child had been infected with syphilis during its birth; the last 2 children had congenital syphilis. The author explains these 2 unusual cases either by the possibility of infection of the fetus by the semen through the membranes during the last period of pregnancy or by admitting a passage of the spirochete into the blood of the mother during the second period of her incubation. Then he points out the importance of the cases from the theoretic and from the practical point of view.

FROM THE AUTHOR'S SUMMARY.

CUTANEOUS TUMORS OF TUBERCULOUS NATURE IN A SIX YEAR OLD GIRL. ERIO SORAGNI, Pediatria **54**:617, 1946.

The author describes a cutaneous tumor in a 6 year old girl which the anamnesis, the tuberculin test and the histologic report indicated was of tuberculous origin, in spite of the absence of the Koch bacillus in the surgically extirpated mass. The growth looked to the author like a cutaneous tuberculoma, and he discusses its genesis and evolution.

Although not rejecting the possibility of a primary tuberculous manifestation, the author thinks more probable the hypothesis of a reinfection, due perhaps to cutaneous inoculation in a subject in an allergic state of high immunization.

FROM THE AUTHOR'S SUMMARY.

Diseases of Blood, Heart and Blood Vessels and Spleen

THE INCIDENCE OF RHEUMATIC FEVER AND HEART DISEASE IN SCHOOL CHILDREN IN DUBLIN, GEORGIA, WITH SOME EPIDEMIOLOGICAL AND SOCIOLOGICAL OBSERVATIONS. R. W. QUINN, Am. Heart J. **32**:234 (Aug.) 1946.

The author examined 401 school children in the fifth, sixth, seventh and eighth grades. The average age of the children was 12 years 7 months. Six children were found to have organic heart disease, of which 4 were rheumatic and 4 congenital. Four other children gave clear histories of rheumatic fever but had no signs of heart disease. Rheumatic fever and rheumatic heart disease were found more frequently in white than in Negro children.

GIBSON, Chicago.

LIFE CYCLE OF WHITE BLOOD CELLS: THE RATE OF DISAPPEARANCE OF LEUKOCYTES FROM THE PERIPHERAL BLOOD OF LEUKOPENIC CATS. JOHN S. LAWRENCE, DONALD M. ERVIN and RAYMOND M. WATRICH, Am. J. Physiol. **144**:284 (July) 1945.

The average rate of disappearance of white blood cells in the cat under the conditions of the experiments described is 881 cells per cubic millimeter per hour.

The hypothesis is advanced that the white blood cells of the cat may be replaced about one and one-half times in twenty-four hours. It is assumed that the white blood cells use the general circulation as a means of transportation. The assumption does not mean that the cells are functionally inactive while in transit, but suggests that their more important functions are performed in body tissues other than the blood.

NOURSE, Cleveland.

CARDIAC ENLARGEMENT IN INFANCY. EDWIN G. EIGEL and C. P. LYNXWILER, Arch. Pediat. **63**:433 (Sept.) 1946.

The authors present a case of marked cardiac enlargement in a 3 month old boy. He was well until three days prior to admission, when he began having attacks of respiratory difficulty and cyanosis. Physical examination and roentgenograms on admission revealed a very large heart. He died suddenly eighteen hours later. Autopsy showed mild fatty degeneration and congestion of the liver, hypostatic pneumonia and passive congestion of the lungs. The aortic valve was thickened and the cusps were adherent. There were many areas of myocardial atrophy, with replacement by fibrous tissue. Thickening of the arteriolar walls was present in the heart, kidney and spleen. The case is presented as one of nonsuppurative myocardial degeneration, as described by Kügel in 1939.

A brief discussion of the other possible causes of cardiac enlargement in infancy is presented.

DAVIS, Denver.

SURGICAL THERAPY OF THE PATENT DUCTUS ARTERIOSUS. JOSIAH C. TRENT, Arch. Surg. **51**:106 (Sept.) 1945.

Five patients who were treated surgically for patent ductus arteriosus are reported on. All these patients were women between the ages of 14 and 34. No fatalities or complications occurred. One woman had a superimposed bacterial endarteritis. All the patients are considered clinically cured.

KAISER, Rochester, N. Y.

EFFECTS OF AN ARTIFICIAL DUCTUS ARTERIOSUS ON EXPERIMENTAL CYANOSIS AND ANOXEMIA. ALFRED BLALOCK, Arch. Surg. **52**:247 (March) 1946.

Experimental studies were performed on dogs in an effort to determine whether the creation of an artificial ductus arteriosus would be helpful in the treatment of pulmonary stenosis or atresia in patients. Attempts to produce the desired degree of pulmonary stenosis were unsuccessful.

In a total of thirty-six experiments the creation of an artificial ductus arteriosus was followed in most instances by an increase in the oxygen saturation of the arterial blood. This increase was due to the passage of a greater quantity of blood which was not fully oxygenated through the pulmonary capillaries. The possible relationship of these observations to the treatment of pulmonary stenosis in patients is discussed.

KAISER, Rochester, N. Y.

FATAL APLASTIC ANEMIA FOLLOWING USE OF TRIDIONE AND A HYDANTOIN. FRANCIS F. HARRISON, ROSWELL D. JOHNSON and DARRELL AYER, J. A. M. A. **132**:11 (Sept. 7) 1946.

A girl, aged 16, died from aplastic anemia after taking trimethadione N.N.R. and methylphenylethyl hydantoin concurrently for a period of six months. All the measures used to prevent and treat infection, to stimulate hemopoiesis and to arrest bleeding proved of no value.

FROM THE AUTHORS' SUMMARY.

APLASTIC ANEMIA AND AGRANULOCYTOSIS FOLLOWING TRIDIONE: A FATAL CASE. ROLAND P. MACKAY and WERNER K. GOTTSTEIN, J. A. M. A. **132**:13 (Sept. 7) 1946.

A 24 year old woman who had taken phenobarbital for nineteen years without ill effect had acute aplastic anemia, agranulocytosis and thrombocytopenia ten months after starting additional therapy with trimethadione N.N.R.

BAIRD, Wauwatosa, Wis.

LEUCOCYTE FRAGILITY IN TRANSITORY LEUCOPENIA. THEODORE L. SQUIER, J. Allergy **17**:197 (July) 1946.

A method is described by which fragility of leukocytes can be estimated.

The transitory leukopenia which follows the ingestion of certain foods is accompanied with increased fragility of leukocytes. The author believes that the increased fragility may be the result of some alteration of the cell membrane.

No conclusion is made as to whether the change results from antigen-antibody reaction or from chemical or mechanical trauma.

HOYER, Cincinnati.

STREPTOCOCCUS S. B. E.: A STREPTOCOCCUS ASSOCIATED WITH SUBACUTE BACTERIAL ENDOCARDITIS. J. C. WHITE and C. F. NIVEN JR., J. Bact. **51**:717 (June) 1946.

In this paper a description is given of a hitherto unrecognized group of streptococci associated with subacute bacterial endocarditis. The organism is of the viridans type, having a unique combination of physiologic characteristics, including the ability to synthesize large amounts of a polysaccharide in a sucrose broth, to hydrolyze arginine and to ferment inulin but not raffinose. The streptococcus was recovered in approximately one third of the cases studied, and its species name is Streptococcus sanguis.

FROM THE AUTHORS' SUMMARY.

THE MEASUREMENT OF THE CIRCULATING RED CELL VOLUME BY MEANS OF TWO RADIOACTIVE ISOTOPES OF IRON. JOHN G. GIBSON 2ND, SOMA WEISS, ROBLEY D. EVANS, WENDELL C. PEACOCK, JOHN W. IRVINE JR., WILFRED M. GOOD and ARTHUR F. KIP, J. Clin. Investigation **25**:616 (July) 1946.

Two isotopes, Fe^{59} and Fe^{55} (half-lives forty-seven days and five years, respectively), were prepared in the cyclotron. They were then made into the compound ferric ammonium citrate and prepared for intravenous use. Geiger-Müller counters differentiated the two isotopes of iron when both were present in a single biologic sample, thus permitting double tracer experiments.

This isotope mixture was given to human subjects intravenously in small doses (1 mg.). The radioactive iron then became incorporated in the hemoglobin molecule of new erythrocytes, thus producing tagged red blood cells. Booster doses were occasionally necessary, since the decay rate of Fe^{59} is 10 per cent weekly.

No booster doses were needed when the five year isotope, Fe^{55}, was used. Some donors were used repeatedly for three years without observed ill effect from the radiation received. Infusions of 70 to 100 cc. of whole donor blood (30 to 50 cc. red blood cells) were given recipients whose red cell volume was to be determined. The degree of dilution of tagged red cells in the nonradioactive recipient expressed a measurement of the total circulating red cell volume.

When used in conjunction with the dye-plasma volume methods (Evans blue method), this method provided an accurate measurement of circulating total blood volume. Its validity depended on the facts (1) that none of the radioactive iron passed out through the membranes of intact erythrocytes and (2) that the ratio of transfused tagged cells to nonradioactive cells remained constant throughout the entire vascular tree despite differences in hematocrit levels in large and small vessels.

BRODSKY, Cincinnati.

RELATION OF THE PLASMA SALICYLATE LEVEL TO THE DEGREE OF HYPOPROTHROMBINEMIA. F. W. CLAUSEN and B. V. JAGER, J. Lab. & Clin. Med. **31**:428 (April) 1946.

A correlation between the level of salicylate in the plasma and the degree of hypoprothrombinemia was established as a result of studies on both human subjects and rabbits receiving large doses of sodium salicylate. Administration of moderately large doses of menadione did not appear to have any effect on the hypoprothrombinemia while salicylate therapy was continued. The prolonged prothrombin time does not appear to be of clinical significance, since hemorrhagic phenomena are infrequent with, and usually do not appear to be a factor in deaths from, salicylate intoxication.

WILKINSON, Galveston, Texas.

OBSERVATIONS ON THE EFFECT OF LOWERED OXYGEN TENSION ON SICKLEMIA AND SICKLE CELL ANEMIA AMONG MILITARY FLYING PERSONNEL. A. B. HENDERSON and H. E. THORNELL, J. Lab. & Clin. Med. **31**:769 (July) 1946.

This report is a description of a study carried out with Negro cadets. An incidence of 7.37 per cent of sicklemia was discovered. Under lowered arterial oxygen tension near the levels of human intolerance, none of the subjects with sicklemia who were tested revealed evidences of immediate intravascular sickling or of increased erythrocyte hemolysis. A volunteer subject with active sickle cell anemia withstood the lowered oxygen tension even better than did the subjects with sicklemia or the control subjects, but administration of oxygen for a short period resulted in more normal erythrocytes.

WILKINSON, Galveston, Texas.

COARCTATION OF THE AORTA: EXPERIMENTAL STUDIES REGARDING ITS SURGICAL CORRECTION. ROBERT E. GROSS and CHARLES A. HUFNAGEL, New England J. Med. **233**:287 (Sept. 6) 1945.

After their studies had proved that it was feasible in experimental animals to excise the constricted portion of the aorta and to reconstruct the vessel by end to end suture, one of the authors (R. E. G.) operated on 2 children to correct coarctation of the aorta. The first child was a boy 6 years old: "Using a posterior thoracic approach, the area of coarctation was readily visualized. The narrowed zone had a lumen only 2 or 3 mm. in diameter. Between clamps, the constricted segment was excised and the remaining ends of the aorta were sewed together.

Through all this the child was in satisfactory condition. As soon, however, as the clamps were removed from the aorta and the enormous vascular bed was opened up, the heart suddenly went into uncontrollable dilatation and the child died. This catastrophe again emphasizes the point that the aortic clamps must be removed slowly.

"The second patient was a 12 year old girl, for whom surgical therapy was undertaken because of marked hypertension. The systolic pressure was frequently recorded at 215, and at no examination was it below 190. No pulsations could be felt in the groins or legs, and no blood-pressure readings could be obtained in the legs . . . The aorta appeared to be completely blocked about 1 cm. beyond the origin of the left subclavian artery. The aorta was doubly clamped, and the constricted area was excised. (Examination of the interior of this specimen showed no opening between its two ends.) The aorta was repaired by direct end to end anastomosis. The clamps were gradually released, a full ten minutes being taken before opening them fully. There were no deleterious effects on the heart. The procedure was tolerated exceedingly well; the wound healed per primam. The patient was discharged from the hospital in a satisfactory condition on the nineteenth postoperative day. The systolic pressure in the arms had dropped to 140. Femoral pulsations could be readily felt, and the systolic pressure in the legs was 145."

GENGENBACH, Denver.

ACUTE PERICARDITIS. D. L. URSCHEL, P. K. BONDY and S. M. SALLEY, New England J. Med. **233**:399 (Oct. 4) 1945.

In 8 cases of acute pericarditis observed during three months at Battey General Hospital, a graph was devised to correlate the size of the heart, the total T wave deflection, the total elevation of the RS-T segment, the pericardial friction rub and the temperature. Elevation of the RS-T segment occurred early, was usually slight and disappeared rapidly. The T wave total began to decrease soon after onset of the disease, but it did not reach its lowest point for about four weeks. Judging from the cases observed, the authors saw no significant electrocardiographic difference in the pericarditis caused by rheumatic fever, tuberculosis or pneumococcic or meningococcic infection.

This graphic method of correlating clinical observations in acute pericarditis emphasizes several points. The diagnosis can seldom be made from a single electrocardiogram. In several of these cases the correct diagnosis was delayed for days or weeks because the typical picture did not appear. The T waves may never become isoelectric or inverted, yet a careful analysis of their total deviation may demonstrate significant alterations. Total inversion is a late observation, usually occurring after the heart has returned to normal size and the fever has subsided. The T waves, however, begin to lose amplitude early in the course of the disease, and it is this progressive change that is most important in early diagnosis. It is not necessary to wait until total inversion has occurred to diagnose pericarditis. By careful daily measurement of the T waves, progressive decrease in amplitude can be detected.

GENGENBACH, Denver.

COARCTATION OF THE AORTA. ROBERT FRIEDENBERG and ARCHER J. SOKOL, New England J. Med. **234**:552 (April 25) 1946.

The major criteria for the diagnosis of coarctation of the aorta are reviewed and evaluated, and 2 cases are described. A brachial blood pressure higher than

the popliteal blood pressure is one of the most constant and most detectable clinical features of the disease.

Delayed, diminished or absent femoral pulsation may be noted in many cases, but this sign cannot be relied on routinely to rule out coarctation of the aorta.

Determination of the blood pressure in the lower extremities must be made in every case in which otherwise unexplained factors exist, regardless of the age of the patient.

GENGENBACH, Denver.

ACUTE DISEASES OF INFANCY ASSOCIATED WITH LEUKOCYTOSIS. R. DEBRE, M. LAMY and ST. THIEFFRY, Arch. franç. de pédiat. **3**:113, 1946.

In an extensive monograph the authors relate their observations in 40 cases characterized by acute leukocytosis. The frequency of this symptom, the evolutive changes, the difficulties of diagnosis and the common errors in interpretation of the hemogram are adequately stressed.

Three schematic types of the white cell formula are discussed in this study: (1) the leukemic-leukoblastemic type, (2) the aleukemic-leukoblastemic type and (3) the leukopenic-aleukoblastic and agranulocytic type.

AMESSE, Denver.

RESISTANCE OF HEMOGLOBIN ON ALKALINE DENATURATION IN SOME HEMOPATHIC SYNDROMES. FEDERICO VECCHIO, Pediatria **54**:545, 1946.

The author studied, with the von Kruger method, the resistance of hemoglobin to alkaline denaturation in normal children and in 15 children with anemia. He observed only in 4 patients with Cooley's anemia (familial erythroblastic anemia) and in 2 with erythroblastic micropoikocytic anemia a behavior of hemoglobin similar to that of fetal hemoglobin; in all the other patients, including 2 with constitutional hemolytic jaundice, the hemoglobin behaved as in normal subjects. The author concludes that in Cooley's anemia and in similar syndromes there is not only an anatomic but also a functional involution of the central hemopoietic organs with persistent production of a pigment of fetal type.

FROM THE AUTHOR'S SUMMARY.

RELATION OF PULSE RATE TO BODY SURFACE OF HEALTHY INFANTS. I. GOBESSI, Riv. di clin. pediat. **40**:338 (June) 1942.

Statistical studies of the body measurements and the pulse rates of 40 infants reveal that the ratio pulse rate: body surface is a constant.

HIGGINS, Boston.

Diseases of Lungs, Pleura and Mediastinum

PENICILLIN TREATMENT OF EMPYEMA: REPORT OF 24 CASES AND REVIEW OF THE LITERATURE. BRUCE BROWN, EDWIN M. ORY, MANSON MEADS AND MAXWELL FINLAND, Ann. Int. Med. **24**:343 (March) 1946.

Empyema due to the pneumococcus, hemolytic streptococcus and staphylococcus was cured in from 50 to 65 per cent of cases without an operation after administration of penicillin.

READING, Galveston, Texas.

"Virus Pneumonia." E. C. Curnen, J. Pediat. **29**:309 (Sept.) 1946.

The subject of virus pneumonia is discussed in relation to clinical features of the disease, laboratory procedures supporting the diagnosis and the present status of studies on etiologic factors. The author calls attention to the development of cold agglutinins, usually between the first and second weeks of the disease in 50 per cent of patients, as well as the appearance of a significant titer of antibodies for both the capsular polysaccharide and a somatic antigen of the MG strain of nonhemolytic streptococcus between the fourth and sixth weeks. The suggestion is made that this micro-organism may play an etiologic role.

Grulee Jr., Minneapolis.

Bronchiectasis in Children and its Prevention. M. Mucci, Riv. di clin. pediat. **41**:102 (Feb.) 1943.

The use of sulfonamide drugs and of sodium nucleinate is recommended as prophylactic measure against bronchiectasis in cases of pulmonary infections, in which rales and coughing persist.

Higgins, Boston.

Respiration in the Infant: I. Effect of a Full Stomach and Position on Respiration in Infancy. Alessandro Bieber, Riv. di clin. pediat. **43**:1, 1945.

The author analyzed the influence of fulness of the stomach and the position of the body on the suckling's respiration. Twenty-six infants were examined, of which 15 were normal and breast fed, 9 had signs of malnutrition and 2 had asthmatic bronchitis.

The simultaneous registration of tracings of both the thoracic and the abdominal respiratory movements, taken while the children were awake (lying on the back and with an empty stomach) during a period of quiet breathing, led invariably to the recognition of a type of mixed respiration in which the thorax and the abdomen expand equally, notwithstanding a certain tendency of the abdominal respiration to prevail. This tendency was remarkable during the first months of life but disappeared as the child grew, so that it was no longer noticeable in those 7 or 8 months of age. The position of the baby's body, the fulness of the stomach and these two conditions combined proved capable of varying not only the type of respiration but also its depth and frequency in the normal, as well as in the undernourished, sucklings under 7 months of age; in older infants no remarkable alteration in the type or depth of respiration was noticed. These two factors produced modifications in the normal suckling according to age, while the undernourished child showed variations in comparison with a normal child of the same age. The persistence of these phenomena was also noticed in the 2 children with pathologic changes (asthmatic bronchitis).

From the Author's Summary.

Diseases of the Gastrointestinal Tract, Liver and Peritoneum

Gastric Emptying and Intestinal Absorption of Dextrose Solutions. E. F. Birchall, P. F. Fenton and H. B. Pierce, Am. J. Physiol. **146**:610 (July) 1946.

In a series of well controlled experiments on rats, the authors observed that the amount of dextrose emptied from the stomach was greater with large volumes of dilute dextrose solutions than with small volumes of concentrated solutions, the

amount of dextrose fed being constant. The rate of absorption was somewhat greater from the more concentrated solutions of small volume. It was also observed that emptying and absorption were greater from large than from small volumes of identical concentration, and emptying and absorption were greater from concentrated than from dilute solutions of identical volume.

STOESSER, Minneapolis.

PEPTIC ULCER IN IDENTICAL TWINS. H. H. RIECKER, Ann. Int. Med. **24**:878 (May) 1946.

Identical twins, aged 20 years, had signs of duodenal ulcer at the age of 18 years. The author states that 3 other such instances are recorded in the literature. He stresses the basically hereditary nature of peptic ulcer.

READING, Galveston, Texas.

UNUSUAL SURGICAL LESIONS OF THE UMBILICUS. CARRINGTON WILLIAMS, Ann. Surg. **124**:1108 (Dec.) 1946.

The author reports three types of congenital lesions of the umbilicus: (1) abnormalities of the urachus, (2) abnormalities of the vitelline duct and (3) unusual hernias at the umbilicus.

The patent urachus and cysts of the urachus are frequently infected, and operation should be delayed until the infection is controlled. Excision of these lesions is the treatment of choice. The navel containing remnants of the vitelline duct should be completely excised. Babies with amniotic hernia, hernia into the cord and eventration of abdominal contents through the wall should be operated on immediately after birth, before infection has developed.

Eleven case reports are given.

BANTIN, Omaha.

DIAGNOSIS OF ACUTE APPENDICITIS IN THE PRESENCE OF DIARRHEA. E. L. KEYES and M. M. COOK, Arch. Surg. **52**:429 (April) 1946.

In the presence of diarrhea the differential diagnosis of acute appendicitis and enteritis is difficult. Even in the absence of diarrhea, acute appendicitis may be mistaken for enteritis because both diseases begin with pain not unlike a sensation of impending diarrhea and because the physical and laboratory findings may be almost identical in the two diseases during the early stage.

Based on a careful analysis of a number of cases, a helpful table on differential diagnosis is prepared, covering the symptoms, physical findings and laboratory findings in early acute appendicitis and enteritis.

KAISER, Rochester, N. Y.

FATE OF THE DISTAL ESOPHAGEAL SEGMENT FOLLOWING THE INDIRECT SURGICAL TREATMENT OF A CONGENITAL TRACHEOESOPHAGEAL FISTULA. WILLIAM P. LONGMIRE JR., J. Thoracic Surg. **15**:279 (Aug.) 1946.

The author discusses the observations at autopsy on an infant operated on for congenital tracheoesophageal fistula at the age of 4 days who survived for two years and ten months. The indirect surgical treatment had been employed, with exteriorization of the upper segment to form a cervical esophagostomy opening and division of the esophagus which was mobilized through an abnormal exposure and delivered as far as possible before division between ligatures. The lower segment was used as a gastrostomy opening.

The remaining intrathoracic segment retained the characteristics of a normal portion of the esophagus. The opening into the trachea was patent. There was no undue accumulation of mucosal secretions nor was there evidence of mediastinitis. The patency of the fistulous communication might account for the infant's chronic cough.

This type of surgical procedure is performed only when direct restoration of esophageal continuity after division of a fistulous communication is not possible.

DORSEY, Chicago.

INFECTIOUS HEPATITIS IN CHILDREN. C. H. WEBB, S. G. WOLFE, R. T. LUCAS and C. E. ANDERSON JR., New Orleans M. & S. J. **99**:259 (Dec.) 1946.

The authors believe there has been a notable increase in the number of cases of acute hepatitis in the past five years. In their clinic only 1 case had occurred in the ten years prior to 1941. Since that date the diagnosis has been made in 41 cases. Cases of icteric and cases of nonicteric hepatitis were about equal in number. Fifteen cases occurred in the 1 to 5 year age group; 20 cases in the 6 to 10 year group and 5 cases in the age group of over 10 years. No cases occurred in children under 1 year. Patients presenting jaundice were usually somewhat sicker than those having no jaundice. Enlargement of the liver occurred in 14 of the 41 cases reported. Attention is directed to the finding of abnormal lymphocytes, apparently identical with those found in acute (virus) enteritis and similar to those found in infections monomucleosis. The laboratory tests found to be most helpful in making the diagnosis were: the leukocyte count with differential study; tests for bile and bilirubin in the urine (especially the methylene blue test for bilirubin); the qualitative van den Bergh test; quantitative determination of serum bilirubin, and Hanger's cephalin-cholesterol flocculation test. Treatment consisted in prolonged rest with a high protein, low fat diet.

BERKLEY, Beverly Hills, Calif.

INCONTINENCE OF ANAL SPHINCTER PRODUCED BY IRRATIONAL OPERATION. M. E. SORREL and SORREL-DEJERINE, Arch. franç pédiat. **3**:166, 1946.

This patient was brought to the Trousseau Hospital by a friend, since the child's mother was dead and the father was absent from home at the time. The history reported complete incontinence with malformation of the sphincter existing since infancy and requiring voluminous dressings. Examination revealed nothing unusual on first inspection: the vesical sphincter was normal; there were no neurologic disturbances, and the general condition was excellent. On insertion of the finger, however, a tight stricture was encountered, so hard and so inelastic that the presence of a submucous wire loop was evident. Roentgengrams confirmed this opinion. The patient had obviously been operated on in infancy and the occasion forgotten. On communicating with the father, he recalled that the girl had been taken to the Trousseau Clinic at about 2 years of age because of rectal prolapsus of moderate degree. The child had also shown rickets, and the treatment had been confined to an antirachitic regimen with simple cleanliness of the parts. The mother had heard of the purse-string operation, and the wire was introduced at another clinic. Soon after this treatment, the incontinence developed.

Operation by the authors with the patient under general anesthesia revealed a normal mucosa; the encircling metal ligature was readily withdrawn, and function returned promptly.

The indications for so formidable a procedure with the use of wire instead of hair are discussed.

AMESSE, Denver.

A CASE OF EPIDEMIC HEPATITIS WITH PROTRACTED COURSE TREATED WITH THE PELLAGRA-PREVENTIVE VITAMINS. ARRIGO DE LUCA, Pediatria **54**:629, 1946.

After having mentioned the advantage of nicotinic acid therapy in acute hepatic diseases, the author describes an unusually severe case of epidemic hepatitis. The patient recovered after treatment with nicotinic acid.

FROM THE AUTHOR'S SUMMARY.

WANDERING OR MOVABLE LIVER. G. ARCE, Acta pediat. españ. **42**:747 (June) 1946.

Wandering or movable liver is a rare anomaly. It must be differentiated from simple hepatoptosis, which is merely a descent of the liver with maintenance of its normal anatomic relations. Wandering liver, on the other hand, is a true dislocation or ectopia, with complete loss of its normal relations with the diaphragm and other organs.

Etiologic factors may be congenital malformations, diminution of abdominal pressure (hypotonia of the abdominal musculature), pathologic lengthening of the ligaments, severe abdominal trauma and defects of the thorax and spine.

Two cases are presented, 1 occurring with "general hypotrophia," old rickets and distention of the abdominal wall. The other case was secondary to poliomyelitis with paralysis of abdominal musculature. The outstanding physical sign was loss of hepatic dulness on percussion.

Most authors prefer conservative treatment, giving mechanical support to the abdominal wall. Various surgical measures have been used and are discussed. In the case reported treatment consisted of improvement in general condition, gain in weight and well directed physical therapy.

KEITH, Rochester, Minn.

HEPATIC STEATOSIS: LIPOTROPHIC FACTORS. O. A. MOSQUERA, Arch. argent. de pediat. **25**:357 (May) 1946.

The physiologic aspects of fat metabolism, the pathologic changes in fatty liver and the action of lipotrophic factors are reviewed. Some aspects of the application of the lipotrophic factors to clinical observations are presented. (This is not an original piece of work.)

ROJAS, Boston.

Nervous Diseases

INFLUENZAL MENINGITIS TREATED WITH STREPTOMYCIN. ARCHIBALD L. HOYNE, ROWINE HAYES BROWN and ARNOLD P. DRUCKER, Arch. Pediat. **63**:559 (Nov.) 1946.

The authors report 3 patients with acute purulent meningitis due to Hemophilus influenzae treated with type B anti-influenza serum, sulfonamide drugs and streptomycin. The last was given intramuscularly for ninety hours in doses of 3 mg. per pound of body weight. Two or three intrathecal injections of 25 mg. were given during the course of the intramuscular administration. All patients had urticaria ten days after administration of the antiserum. One child had rather severe residual effects, but the other two were normal.

In 1 child who had been ill nineteen days, marked clinical improvement was noted immediately after the administration of intramuscular and intrathecal streptomycin.

It is felt that streptomycin therapy is of benefit even when started late in the course of the disease.

DAVIS, Denver.

DIAGNOSIS AND TREATMENT OF STRICTURES OF THE AQUEDUCT OF SYLVIUS (CAUSING HYDROCEPHALUS). WALTER E. DANDY, Arch. Surg. **51**:1 (July-Aug.) 1945.

Strictures of the aqueduct of Sylvius are usually congenital maldevelopments, characterized by a replacement of this channel with glial tissue. Since this channel is the only one for passage of the cerebrospinal fluid that arises from the choroid plexuses of the third ventricle and both lateral ventricles, hydrocephalus involving these ventricles is a necessary and unfailing sequela when the channel is closed.

For infants the diagnosis of a stricture at the aqueduct is simple and fairly free from error. If the test with dye (phenolsulfonphthalein) shows an obstruction in the ventricular system, the obstruction is either at the aqueduct or at the foramens of Magendie and Luschka. If the inion is low, the obstruction is at the aqueduct; if the inion is high, the obstruction is at the foramens of Magendie and Luschka.

For children over 1 year of age, the diagnosis can be made from ventriculographic studies. The shape of the shadow in the aqueduct of Sylvius—funnel shaped or triangular—will frequently establish the diagnosis without necessity for a cerebellar operation.

The operation of choice for hydrocephalus is a third ventriculostomy by means of a temporal approach. Cures are attained in most cases when the patient is more than 1 year old and in less than half the cases of infants. Excellent results are obtained in the older group.

KAISER, Rochester, N. Y.

VIRUS DISEASES OF THE NERVOUS SYSTEM. THOMAS M. RIVERS, J. A. M. A. **132**:427 (Oct. 26) 1946.

The virus diseases of the central nervous system, as they are now believed to be, are: rabies, poliomyelitis, St. Louis encephalitis, eastern equine encephalitis, western equine encephalitis, Venezuelan equine encephalitis, Japanese B encephalitis (Russian autumn encephalitis or Australian X disease), Russian spring-summer encephalitis, lymphocytic choriomeningitis, louping ill, B virus encephalitis, mumps meningoencephalitis, lymphogranuloma venereum encephalitis, herpes simplex encephalitis, von Economo's encephalitis and Guillain-Barré's disease. Postinfectious or postvaccinal encephalitides occur with vaccination against rabies and smallpox and after chickenpox, measles, influenza, mumps and other infections. The pathologic changes in the latter cases are usually located in the white matter of the brain and about veins, whereas in the diseases due to the direct action of the virus the pathologic changes are in the gray matter.

Diagnosis must often be made in the laboratory by neutralization or complement fixation tests. Two specimens of blood are usually needed, one taken during the early stage and one during convalescence, to demonstrate changes in antibodies.

"Aseptic precautions should be used in collecting blood, and the serum should be removed from the clot as soon as possible and refrigerated if it is not sent to the laboratory immediately."

BAIRD, Wauwatosa, Wis.

NEWER AGENTS IN THE TREATMENT OF EPILEPSY. W. G. LENNOX, J. Pediat. **29**:356 (Sept.) 1946.

The author briefly discusses all facets of the problem of epilepsy, stressing the need for increased interest in the treatment of the disease and for more aggressive attitude toward the convulsive disorders of childhood. Criteria for the selection of the drug of choice according to the presenting symptoms are described.

GURLEE JR., Minneapolis.

THE TREATMENT OF PNEUMOCOCCIC AND STAPHYLOCOCCIC MENINGITIS WITH PENICILLIN AND SULFONAMIDES. WENDELL H. HALL, JOHN ALDEN, GEORGIE M. BURT and WESLEY W. SPINK, Minnesota Med. **29**:553 (June) 1946.

Of 17 patients with pneumococcic meningitis who were treated with penicillin, 13 recovered. Sixteen of the 17 patients received both penicillin and sulfadiazine or sulfamerazine. Three children with staphylococcic meningitis were treated with a combination of penicillin and sulfonamide compounds, and 2 recovered. The authors recommended that in the treatment of suppurative meningitis caused by pneumococci or staphylococci, penicillin should be administered intravenously or intramuscularly and intrathecally. In addition, sulfadiazine or sulfamerazine should be given orally or parenterally, but not intrathecally.

STOESSER, Minneapolis.

THE PENETRATION OF PENICILLIN THROUGH NORMAL AND INFLAMED MENINGES. J. MURRAY KINSMAN and C. ANTHONY D'ALONZO, New England J. Med. **234**:459 (April 4) 1946.

The results of this study showed that the appearance of penicillin in the spinal fluid after large extrathecal doses was irregular and inconstant and never larger than 0.05 unit per cubic centimeter.

It is the authors' opinion that patients with pneumococcic, streptococcic or staphylococcic meningitis should receive penicillin by both the extrathecal and the intrathecal route. For meningococcic meningitis, sulfadiazine is probably preferable to penicillin, but here, too, if penicillin is administered it should be given both extrathecally and intrathecally.

GENGENBACH, Denver.

CONGENITAL ABSENCE OF THE SEPTUM PELLUCIDUM ASSOCIATED WITH INTERNAL HYDROCEPHALUS. WILLIAM P. SAVAIN, Radiology **46**:270 (March) 1946.

A Negro boy, aged 13 years, showed no evidence on encephalograms of a septum dividing the lateral ventricles. Roentgenograms illustrating this unusual condition, together with evidence of well rounded lateral ventricles, accompany the report.

ANSPACH, Chicago.

SUBDURAL HYGROMA IN INFANTS. CLAUDE GROS and J. BALMES, Arch. franç. de pédiat. **3**:232, 1946.

Subdural hygroma in infants, a condition rarely reported in France but

rather common in America, is discussed in this contribution. A case is reported, and an extensive bibliography accompanies the paper.

AMESSE, Denver.

CONGENITAL PATHOLOGIC CHANGES IN THE BRAINS OF CHILDREN. V. SAGGESE, Riv. di clin. pediat. **40**:417 (July); 449 (Aug.) 1942.

Saggese reports 35 cases of congenital cerebral abnormalities in children, in the study of which encephalograms were made. The diagnostic value of encephalography in determining the nature, extent and location of the pathologic changes in the brain is stressed.

HIGGINS, Boston.

Psychology and Psychiatry

AMAUROTIC FAMILY IDIOCY (TAY-SACHS' DISEASE). WILBUR H. HANSEN, Arch. Pediat. **63**:479 (Sept.) 1946.

A case of the infantile type of Tay-Sachs disease is presented. This report is followed by a discussion of the possible cause and the incidence, symptoms, signs, points in diagnosis and methods of treatment used.

DAVIS, Denver.

THE NEED OF FACILITIES FOR THE CARE OF FEEBLEMINDED INFANTS AND YOUNG CHILDREN. ISOBEL V. DUGUID, New England J. Med. **233**:294 (Sept. 6) 1945.

Recently, the members of a committee sponsored by the New England District of the American Association of Medical Social Workers brought together evidence from their experience in the care of feebleminded infants and young children as the parents have sought their help. To focus the problem, it was decided to account for all mentally defective children under 6 years of age known to these workers between Jan. 1, 1943 and June 30, 1944. There were 189 such children, of whom 61 were under 1 year and 99 under 2 years of age. There were 113 boys and 76 girls.

All the children were feebleminded. Nine were classified as idiots and 26 as mongols; 27 were hydrocephalic and 3 microcephalic, and many had additional neurologic or physical defects. In 60 cases the defective patient was the only child, in 99 cases there were 1 to 3 other children, in 26 cases there were more than 3 other children and in 4 cases information regarding the number of children was lacking. Social situations within the families supplied further complications. As of June 30, 1944, the terminal date of the study, only 28 children had placement that could be considered permanent. Thirty-three children had died. Of the 128 others, institutional care had been recommended for all but 21, and in 54 cases it was considered to be urgent; in at least 75 cases of this group application had been made at one or more state institutions.

A realistic approach to the problem presented in this limited report brings sharply before one the need for a substantial increase in the present resources, in terms of additional state institutions for custodial care which maintain standards offering security both to the children placed therein and to their parents.

GENENBACH, Denver.

Is There a Word for Aphasics? Jeanette O. Anderson, Quart. J. Speech **32**:485, 1946.

Aphasia is a basic disorder of symbolization that may exhibit any combination of many asphasic manifestations, classified as expressive, receptive, associative and mixed. The aphasic patient must possess a literal word received and/or produced by one who has been deprived of "propositional speech." In every case in which there is such a word, other words can be trained in. From one to six years of such training may be expected. After an initial period of training, varying in length, each subject tends to reach a plateau, somewhere short of his former level. Many patients learn to speak, write and read enough to carry on at home or in simple employment. Neither the child nor the adult with aphasia profits from speech correction until he spontaneously attempts some form of overt communication. This communication may be oral, manual or graphic. Children learn well when objects, toys, pictures and situations are associated with speech sounds. Adults seem to learn better from written or printed symbols than they do from the reality. Strongly emotional stimuli are to be avoided, because they lead in the aphasic person to noncortical language, to uncontrolled speech and to excesses of emotion, which inhibit rather than stimulate volitional speech. Aphasic persons must be guarded from emotional excesses. The cortical lesion reduces the effects of all the functions of the cortex, with consequent emotional behavior peculiarities. Temper tantrums, laughing and crying without moderation, hysteria, rapid changes in mood are all common in aphasic persons and are often charged against a psychosis rather than the condition itself. Aphasic patients ready for speech training are usually babbling and reproducing the early stages of normal speech development. Phonetic drills and the incorporation of speech sounds into nonsense syllables are valueless except as they are made an integral part of the normal developmental process. Visual, auditory and kinesthetic approaches are used. The olfactory and gustatory images of language are somewhat valuable. A combination of sensory approaches usually produces better results than if only one stimulus is presented. The cortex appears to function as a unit, and recovery in these cases appears to be the result of reorganization of the entire central nervous system. Any interference in the extreme selectivity and specificity of the central nervous system is reflected throughout the system and its activities. Speech is never taught as an entity, an end it itself, but always as an integral part of the business of living. Aphasic patients may, therefore, progress if (1) there is no progressive destruction of brain tissue, (2) there is no previous history of inability to learn language for reasons other than aphasia, (3) the patient has attempted spontaneously to communicate and (4) regular skilled daily speech training is adapted to his abilities and linguistic residues and incorporated into his way of life.

Palmer, Wichita, Kans.

Roentgenograms of the Chest in Mental Deficiency. J. T. Danzer, Radiology **46**:244 (March) 1946.

A study of roentgenograms of the chest of inmates of Polk State School, Penn., led the author to conclude that peribronchial shadows are commoner in patients with a low intelligence quotient, and that all such patients are prone to show less resistance to tuberculosis than the normal person. The perivascular infiltrations are common throughout both lungs, and mottled areas of congestion may be seen in any portion of the lower two thirds of the lungs. One of the theories advanced is the fact that low grade imbeciles and idiots have a high

cough threshold. The phlegm, or mucus, in the upper part of the respiratory tract gives them no concern; consequently, this material may remain in the respiratory tract for a long time. Because of inactivity their muscles are flabby and deficient. Swallowing of air is common; this elevates the diaphragm and compresses the lungs. Many persons with mental deficiencies seem to have no resistance whatever to tertiary tuberculosis.

ANSPACH, Chicago.

PSYCHOGENESIS AND EARLY MENTAL DEVELOPMENT OF THE CHILD. V. SAGGESE, Riv. di clin. pediat. **41**:321 (June) 1943.

This thirty-six page article reviews the earliest manifestations of psychologic developments of various types in the infant and the young child. A three page bibliography accompanies the article.

HIGGINS, Boston.

Diseases of the Genitourinary Tract

FUNCTIONING OF THE FETAL KIDNEY AS REFLECTED BY STILLBORN INFANTS WITH HYDROURETER AND HYDRONEPHROSIS. L. J. WELLS and E. T. BELL, Arch. Path. **42**:274 (Sept.) 1946.

The authors report 4 cases of stillborn infants who showed at autopsy hydroureter, with or without hydronephrosis, unilaterally or bilaterally. These cases were selected from a series of 52 stillborn infants with spina bifida. The presence of the dilated urinary passages is interpreted as evidence that fluid had been secreted prior to the interruption of placental circulation. The literature is reviewed, and these cases are offered as additional evidence for the secretion of fluid by the kidney of the human fetus.

GEREU, St. Louis.

WILMS'S TUMOR: A REVIEW OF SIXTEEN CASES. R. M. NESBIT and F. M. ADAMS, J. Pediat. **29**:295 (Sept.) 1946.

The authors discuss a series of 16 children for each of whom the diagnosis of Wilms's tumor was established. Irradiation preceded nephrectomy for all children in whom the size of the tumor made surgical treatment technically difficult, and postoperative irradiation was given each patient. The survival rate after three and a half years was 58.4 per cent. Several children had survived as long as eleven and a half years.

GRULEE JR., Minneapolis.

Diseases of the Ductless Glands; Endocrinology

EFFECT OF VITAMIN B COMPLEX DEFICIENCY, CONTROLLED INANITION AND METHIONINE ON INACTIVATION OF ESTROGEN BY THE LIVER. VICTOR A. DRILL and CARROLL A. PFEIFFER, Endocrinology **38**:300 (May) 1946.

It is known that estrogenic substances can be inactivated by the liver. When pellets of estrone U.S.P. are implanted intrasplenically in castrated female rats, vaginal cornification will not occur if a normal diet is fed. This condition is interpreted as being due to the inactivation of estrone by the liver. However, if a diet deficient in the whole vitamin B complex is fed, vaginal cornification will occur. When yeast was added to the deficient diet, the liver regained its ability to inactivate estrone as judged by the return of the vaginal smear to an anestrous condition.

The present study is concerned with the effect of deficiency of the vitamin B complex and of controlled inanition on the vaginal response to splenic implants of estrone.

It is concluded that the effect of acute deficiency of vitamin B complex in producing a failure of the liver to inactivate estrone is due to the concomitant inanition. Supplements of methionine were ineffective in preventing the occurrence of vaginal cornification in either the animals deficient in vitamin B complex or in animals with restricted food intake.

JACOBSEN, Buffalo.

HYPERPLASIA OF THE THYROID GLAND OF RHESUS MONKEYS AFTER THIOURACIL TREATMENT. EARL T. ENGLE and HENRY ARANOW JR., Endocrinology **38**:325 (May) 1946.

Administration of thiouracil causes hyperplasia and colloid depletion in rhesus monkeys as it does in other animals and in man. Certain special histologic features of hyperplasia of the thyroid gland in the monkey are described in this report.

JACOBSEN, Buffalo.

THE EFFECT OF THIOURACIL HYPOTHYROIDISM ON REPRODUCTION IN THE RAT. G. E. SEEGAR JONES, E. DELFS and E. C. FOOTE, Endocrinology **38**:337 (June) 1946.

Hypothyroidism induced by thiouracil has no effect on the reproductive system of the adult male rat, as judged by the ability to sire litters. Prolonged administration of thiouracil associated with hypothyroidism in the adult rat does not cause sterility but does interfere with continuation of gestation, causing resorption of embryos in 100 per cent of the cases.

JACOBSEN, Buffalo.

ACTIVATION OF THE ANTERIOR HYPOPHYSIS BY ELECTRICAL STIMULATION IN THE RABBIT. J. E. MARKEE, CHARLES H. SAWYER and W. HENRY HOLLINSHEAD, Endocrinology **38**:345 (June) 1946.

In the present experiments an effort was made to secure by means of electric stimulation further information on the relation of the nervous system to the anterior lobe of the hypophysis.

Stimulation of the cervical sympathetic trunk in twenty-seven unanesthetized mature female rabbits gave no evidence that the release of luteinizing hormone from the anterior lobe of the hypophysis can be induced by normal activity of these nerves. Bipolar stimulation of the pituitary gland failed to effect ovulation in 7 cases. Bipolar stimulation of the hypothalamus, however, in the identical conditions seen to be ineffective on the hypophysis, induced ovulation in 3 out of 4 animals. The aforementioned experiments confirm the observations of other workers that the hypothalamus plays a major role in the release of luteinizing hormone from the anterior lobe of the hypophysis. However, the difference in the electrical excitability of the hypophysis and in that of the hypothalamus, as shown here, is interpreted as indicating that the hypothalamus does not exert a direct neural control over the anterior hypophysis, rather the presence of a long humoral link seems implied by the results of these experiments.

JACOBSEN, Buffalo.

LOCAL INHIBITION OF HAIR GROWTH IN DOGS BY PERCUTANEOUS APPLICATION OF ESTRONE. W. LANE WILLIAMS, W. U. GARDNER and J. DEVITA, Endocrinology **38**:368 (June) 1946.

Small amounts of estrone U.S.P. dissolved in oil and alcohol were applied locally to shaved or clipped areas of the skin on the lateral body walls of 3 different dogs. Estrone so applied inhibited the rate of regrowth of hair in the treated areas, apparently by a direct action on the skin and the hair follicles.

JACOBSEN, Buffalo.

THE SUCCINIC DEHYDROGENASE ACTIVITY OF OVARIAN AND LUTEIN TISSUE. ROLAND K. MEYER, W. H. MCSHAN and WILMA F. ERWAY, Endocrinology **37**:431 (Dec.) 1945.

As a part of a program to study the relation of hormones to intracellular enzymes, experiments were designed to determine the succinic dehydrogenase activity of the ovaries of immature rats which had been stimulated by gonadotropic hormones, the activity of the ovaries of pregnant and pseudopregnant rats and that of the ovaries of female rats having normal estrous cycles. As ovarian tissue in the rat is composed largely of follicles and corpora lutea, data were obtained concerning the amount of succinic dehydrogenase in the corpora lutea dissected from ovaries removed during the aforementioned phases of the reproductive cycle. The high succinic dehydrogenase activity of the ovaries of pregnant and pseudopregnant rats is due to the high activity of the functional lutein tissue. Conversely, the low succinic dehydrogenase activity of lutein tissue from the ovaries of rats in diestrus, or from those of immature rats given gonadotropins, probably accounts for the low activity of the enzyme in ovaries of these types. It is suggested that the succinic dehydrogenase activity of lutein tissue might be used as a criterion of the level of function of corpora lutea.

JACOBSEN, Buffalo.

ACTION OF THE HYPERGLYCEMIC PRINCIPLE FROM THE URINE OF HEALTHY CHILDREN ON THE GLYCOGEN OF THE LIVER. A. LIOTTA, Riv. di clin. pediat. **40**:558 (Sept.) 1942.

The observations were made on guinea pigs. The urinary extract, although it increased the blood sugar level, did not lower the glycogen of the liver. Therefore, since glycogenolysis did not occur, the source of the increased blood sugar must be sought elsewhere. The suggestion was made that the hyperglycemia is the result of a ketosis caused by increased oxidation of fatty acid.

HIGGINS, Boston.

Diseases of the Muscles, Bones, Joints and Lymph Glands

CHONDRO-OSTEODYSTROPHY (MORQUIO'S DISEASE). EDWIN P. SCOTT and C. C. ROTONDO, Arch. Pediat. **63**:261 (June) 1946.

The authors report a case of Morquio's disease in a Negro girl who was followed from birth to the age of 4½ years. The results of serial roentgenographic studies, as well as body mensurations, are included.

GRULEE JR., Minneapolis.

PENICILLIN IN THE TREATMENT OF CHRONIC OSTEOMYELITIS. JOSEPH BUCHMAN and JOHN E. BLAIR, Arch. Surg. **51**:81 (Sept.) 1945.

The authors studied 47 patients with sixty-eight lesions of chronic osteomyelitis. Several of these patients, representing both children and adults, were treated

with intramuscular injections and local applications of penicillin to the exclusion of surgical intervention. This procedure was totally ineffective. Of 27 patients with chronic osteomyelitis who were treated with preoperative and postoperative intramuscular administration of penicillin and with thorough saucerization of the focus and primary closure of the resultant wound, in 23 extraordinarily good results were obtained.

KAISER, Rochester, N. Y.

A STUDY OF THE DIFFUSION OF PENICILLIN ACROSS THE SEROUS MEMBRANES OF JOINT CAVITIES. HAROLD L. HIRSH, HENRY L. FEFFER and C. BARBARA O'NEIL, J. Lab. & Clin. Med. **31**:535 (May) 1946.

The studies described indicate that penicillin will diffuse across the serous membranes of joints when given systemically or intra-articularly. In a significant percentage of cases, after systemic administration insufficient amounts of penicillin diffused into the joint fluid to control the infection. This observation corresponds to clinical experience; systemic administration of penicillin alone is inadequate in the treatment of pyogenic arthritis complicating bacteremia.

WILKINSON, Galveston, Texas.

UNUSUAL BONE LESIONS IN AN INFANT, PROBABLY OSTEITIS TUBERCULOSA MULTIPLEX CYSTOIDES. F. Y. KHOO and Y. YANG, Radiology **46**:263 (March) 1946.

A Chinese infant at the age of 11 months had slight swelling of the left middle finger. At the same time an attack of fever accompanied with moderate swelling of the right submaxillary region occurred. The child appeared well nourished at 14 months of age. When he was brought to the hospital, results of all blood studies were essentially normal. Roentgenographic examination showed some widening of the shaft of the proximal phalanx of the left hand, with tiny punched-out areas of rarefaction distally. The cortex of adjacent phalanges appeared slightly expanded. Irregular periosteal thickening of the greater part of the left ulna and of the middle of the radius was also present. These changes in bone persisted for more than six months before disappearing. Bilateral cervical adenitis developed the following year and suppurating nodes were excised. The author was unable to decide what to call this unusual case and mentioned infantile scurvy and the diagnosis given in the title as possibilities.

NOTE.—The abstracter notes a great similarity between data on this patient and on one of his own. The manifestations in both patients, he believes, belong to the group of symptoms described recently by Caffey as a new disease syndrome.

ANSPACH, Chicago.

CONGENITAL ABSENCE OF THE ODONTOID PROCESS. J. McK. IVIE, Radiology **46**:268 (March) 1946.

A soldier felt immediate weakness of the extremities after an injury to the neck. Roentgenographic examination revealed partial dislocation of the atlas and axis and complete absence of the odontoid process. After reduction, complete recovery occurred. One other similar case in the literature is described in this report.

ANSPACH, Chicago.

MULTIPLE RHEUMATOID ARTHRITIS (STILL'S DISEASE): REPORT OF A CASE. R. SCAPATICCI, Riv. di clin. pediat. **41**:193 (April) 1943.

A report with clinical findings and observations at autopsy is given of a case of multiple rheumatoid arthritis (Still's disease) in a boy 2 to 4 years of age. The conclusion is drawn that the disease is autonomous and of unknown origin.

HIGGINS, Boston.

PSEUDORACHITIC THORAX. OTTO TEZNER, Annal. pediat. **167**:207 (Oct.) 1946.

The author describes a kind of thoracic configuration in infants, similar to rachitic thorax, with a complete absence of all other clinical and roentgenographic signs and with normal chemical value for the blood.

The nonrachitic pathogenesis of this deformity is assumed, and it is proposed to name it thorax pseudorachiticus.

FROM THE AUTHOR'S SUMMARY.

Skin Diseases; Allergy

MOLLUSCUM CONTAGIOSUM TREATED WITH SULFADIAZINE. CARL W. LAYMON, Arch. Dermat. & Syph. **53**:643 (June) 1946.

The management of molluscum contagiosum in a 12 year old boy is presented. The lesions were so numerous (about one hundred) that local therapy would have proved formidable. Treatment consisted of administration of sulfadiazine, 15 grains (1 Gm.) four times a day for one week and 7½ grains (0.5 Gm.) four times a day the second week. At the end of the second week the previous nodules were gone and only pink macules remained. No recurrence developed in several months thereafter.

Reports in the literature indicate that both sulfapyridine and sulfadiazine are effective drugs in the treatment of this condition. Harmless local measures are usually satisfactory in controlling this disease. However, with patients having extensive lesions chemotherapy with sulfonamide compounds may be used effectively.

REMBOLDT, Iowa City.

CONTROL OF RINGWORM OF THE SCALP AMONG SCHOOL CHILDREN IN HAGERSTOWN, MD., 1944-1945. LOUIS SCHWARTZ, SAMUEL M. PECK, ISADORE BOTVINICK, ARMOND LEO LEIBOVITZ and ELIZABETH S. FRASIER, J. A. M. A. **132**:58 (Sept. 14) 1946.

Through the cooperation of the local medical society and with the aid of the United States Public Health Service, an epidemic of ringworm of the scalp due chiefly to Microsporon audouini was controlled in one year without excluding children from school and with the use of topical applications only. The evidence indicates that the principal source of infection was barber shop equipment, particularly electric clippers. Routine examination of school children was done every three months with the use of the Wood light. Younger children in infected families were also examined. Treatment centers were set up in seven of the schools to assure daily therapy. Seventeen different medicaments were used. The most efficacious were salicylanilide 5 per cent in "carbowax" 1500 and copper undecylenate saturated solution in "carbowax" 1500.

BAIRD, Wauwatosa, Wis.

RINGWORM OF THE SCALP: CLINICAL DATA ON RECENT CASES; EXPERIENCE WITH LOCAL ENDOCRINE THERAPY. GEORGE M. LEWIS, MARY E. HOPPER and FREDERICK REISS, J. A. M. A. **132**:62 (Sept. 14) 1946.

The report includes the study of 312 cases of tinea capitis due principally to Microsporon audouini. Roentgen therapy was considered superior to other forms of treatment and was responsible for 90 per cent of the cures in this series. Preliminary laboratory testing with estrogenic and androgenic substances showed that while some hormones have fungistatic ability in vitro, the results were disappointing when these hormones were applied in adequate doses directly to the local areas of infection.

BAIRD, Wauwatosa, Wis.

LOCAL TREATMENT OF TINEA CAPITIS. J. LOWRY MILLER, F. PHILIP LOWENFISH and GUILA F. BEATTIE, J. A. M. A. **132**:67 (Sept. 14) 1946.

This report is of 928 cases of tinea capitis treated at Vanderbilt Clinic, New York, between January 1943 and May 1945. Microsporon audouini was the infective agent in 96.9 per cent of the cases.

Of the numerous fungicides employed for small groups of cases, none appeared outstanding. Of three fungicides (dinitrocyclohexyl phenol, sodium propionate and undecyclenic acid) whose results were more thoroughly compared, none was sufficiently effective to be of practical value in the treatment of the disease. The cures obtained seemed to depend on the thoroughness with which manual epilation was carried out rather than on the fungicides employed. However, even the most careful manual epilation failed to cure the infection in many cases. Although the fungicides failed in the majority of cases, they apparently served in most instances to prevent spread of the infection to new areas of the scalp. For this purpose they are an essential adjuvant to manual epilation, but iodine and mercury seem as effective as any of the newer fungicides which were tried.

BAIRD, Wauwatosa, Wis.

Miscellaneous

A SURGICAL SPECIMEN CONSISTING OF A PARTIALLY DEVELOPED PARASITIC FETUS. LUIS PAVON SARRELANGUE, Arch. Surg. **52**:479 (April) 1946.

The author describes an unusual monstrosity. A parasitic fetus consisting of two legs and the lower part of the abdomen was surgically removed from its point of attachment to the anterior abdominal wall of an infant 2 months and 23 days old. After the removal of the parasitic fetus, the child made a good surgical recovery and appeared to be normal two months later.

KAISER, Rochester, N. Y.

CETYL PYRIDINIUM CHLORIDE. R. QUISNO and MILTON J. FOTER, J. Bac. **52**:111 (July) 1946.

Cetylpyridinium chloride ("ceepryn") is a cationic detergent which is soluble in water, chloroform, alcohol and acetone and produces a depressant action on surface tension. The germicidal properties of cetyl pyridinium chloride were studied by the authors, who found that the drug is effective in high dilutions against a variety of gram-positive and gram-negative bacteria, certain common pathogenic fungi and the flagellate Trichomonas vaginalis. It is germicidal in high dilutions under acid as well as alkaline conditions. It is effective in moderate

to high dilutions in the presence of animal serum. The nontoxic character of the compound and its bactericidal properties under diverse conditions make it an exceptionally versatile and valuable disinfectant.

STOESSER, Minneapolis.

UREA AS AN ADJUNCT TO SULFONAMIDE THERAPY. HARRY VESELL; IRMA H. GROSS and RALPH M. SUSSMAN, J. Lab. & Clin. Med. **31**:444 (April) 1946.

A girl aged 18 with subacute bacterial endocarditis was treated successfully by means of sodium sulfadiazine, with urea as an adjunct. The patient made a complete recovery after this form of treatment, in which very high levels of sulfadiazine were reached in the blood. There are several possible modes of action of the urea. One of these is the increased solubility of sulfadiazine in the urine, with reduction of crystalluria and consequent renal damage. The authors suggest that this combined type of therapy may be desirable in some patients resistant to treatment with penicillin.

WILKINSON, Galveston, Texas.

DYE POISONING IN INFANCY. E. P. SCOTT, GEORGE E. PRINCE and C. C. ROTONDO, J. Pediat. **28**:713 (June) 1946.

The authors report two episodes of dye poisoning in infancy, one in a hospital nursery and the other in an isolation ward.

It was found that in 3 infants wearing aniline-stamped, unlaundered diapers in the nursery typical symptoms of dye poisoning developed. The second episode occurred in the isolation ward and was apparently due to bathing 3 infants with unlaundered, aniline-stamped washcloths. The babies had nutritional disturbances and pronounced excoriation of the buttocks. Methylene blue was used intravenously in the treatment of 1 infant, with dramatic response.

AUTHORS' ABSTRACT.

THE USE OF SULFADIAZINE-SULFATHIAZOLE MIXTURES IN THE TREATMENT OF CHILDREN. D. LEHR, L. SLOBODY and W. GREENBERG, J. Pediat. **29**:275 (Sept.) 1946.

On the basis of experimental studies and detailed measurements on 3 human subjects, the authors treated a group of 200 children having acute bacterial infections with mixtures of equal parts of sulfadiazine and sulfathiazole. Their data indicate that the mixture was readily absorbed and eliminated and that levels of the drugs in the blood at the end of four hours were as high or higher than those resulting from the administration of an equivalent weight of sulfadiazine. In an appreciable number of cases it was their opinion that conspicuously better therapeutic results were obtained with the use of the mixture. Finally, they concluded that even with the intentional omission of adjuvant alkali therapy toxic reactions were lessened.

GURLEE JR., Minneapolis.

STRAMONIUM POISONING. L. M. SPORTSMAN, J. Pediat. **29**:345 (Sept.) 1946.

The cases of 2 children who ingested the seed of Datura stramonium (jimson weed) are discussed. Inlcuded in the clinical picture were the following striking features: difficulty in swallowing, disorientation followed by delirium, widely dilated, unreactive pupils, plucking phenomenon, preservation and amnesia. The misleading similarity, on superficial examination, of this syndrome to psychiatric disorders is pointed out.

GURLEE JR., Minneapolis.

THE EFFICACY OF 2,3-DIMERCAPTOPROPANOL (BAL) IN THE THERAPY OF POISONING BY COMPOUNDS OF ANTIMONY, BISMUTH, CHROMIUM, MERCURY AND NICKEL. HERBERT A. BRAUN, LEHMAN M. LUSKY and HERBERT O. CALVERY, J. Pharmacol & Exper. Therap. (supp.) **87**:119 (Aug.) 1946.

BAL was found to be an effective antidote in acute poisoning caused by the administration of toxic doses of salts of antimony, bismuth, chromium, nickel and mercury in the rabbit. With the administration of BAL, the tolerance of rabbits to lethal doses of compounds of these heavy metals was increased by at least 50 per cent. BAL was ineffective in the treatment of rabbits acutely poisoned by salts of lead, thallium and selenium. In the case of lead and selenium, the action was additive.

The study was made on 1,226 rabbits.

FROM THE AUTHORS' CONCLUSIONS.

STUDIES ON THE PHARMACOLOGY OF SALICYLATES. PAUL K. SMITH, HELEN L. GLEASON, C. G. STOLL and S. OGORZALEK, J. Pharmacol. & Exper. Therap. **87**:237 (July) 1946.

These studies on the pharmacology of salicylates were made on young men (aviation students). Of the conclusions, two are of clinical interest: (1) The administration of sodium bicarbonate with salicylates results in lower salicylate levels in the plasma than when the salicylate alone is given. (2) The administration of sodium bicarbonate to patients receiving sodium salicylate results in an increased excretion of free salicylate, with the renal clearances of free salicylate increasing rapidly above urinary *p*H.

PILCHER, Cleveland.

WARTIME ADVANCES IN MEDICINE WHICH MIGHT BE TRANSLATED INTO CIVIL PRACTICE. ALEXANDER BIGGAM, Edinburgh M. J. **53**:413 (Aug.) 1946.

The author believes that many things learned during the recent war will be useful in medical practice generally. Among these is the control of insects and various pests. The multi-purpose insecticide, "DDT" (dichlorodiphenyl trichloroethane), became the outstanding recent factor in preventive medicine. It is ideal as to its lethal effect on insects, while being of low toxicity for the human being; it is stable and therefore exerts a residual effect unequaled by other substances.

Dimethylphthalate proved to be of great importance as an insect repellent, outmoding the oil of citronella. Biting insects are kept away for two or three hours. Interesting details are given as to its application. This substance is also a miticide, protecting against the carrier of scrub typhus when applied to the clothing at intervals. The Ministry of Production has published a "Summary of Information on Insecticides and their Repellents."

The author believes there is some danger in using sulfonamide drugs in tropical climates because of the injurious effects on the kidneys, brought about by scant urination and loss of fluids from diarrheal diseases.

Administration of 3 Gm. of a sulfonamide drug for each of three days will cause the disappearance of the carrier state of cerebrospinal meningitis and prevent the occurrence of new cases.

There would seem to be use for the laboratory diagnosis of smallpox (elaborated by van Rooyen) in differentiating it from certain cases of chickenpox.

NEFF, Kansas City, Mo.

News and Comment

GENERAL NEWS

Fellowships Offered by National Foundation for Infantile Paralysis.—The National Foundation for Infantile Paralysis is offering fellowships in research, physical medicine and public health. Inquiries should be addressed to the National Foundation for Infantile Paralysis, Inc., 120 Broadway, New York 5.

Book Reviews

Muscular Contraction. By Alexander Sandow, M.D., and various authors. Annals of the New York Academy of Sciences, Volume XLVII. Price, $3. Pp. 665-930. New York: New York Academy of Sciences, 1947.

This volume is the report of a conference on muscular contraction held by the section of biology and the section of physics and chemistry of the New York Academy of Sciences on Feb. 15 and 16, 1946, at the American Museum of Natural History, New York city.

Alexander Sandow states in the introduction to the conference: "Here we find studies of structure: gross, microscopic and, especially today, ultramicroscopic, and of function in its many subdivisions, such as permeability, metabolism in all its chemical and thermodynamic aspects, bioelectricity, secretion . . . and, of course, above all, . . . contractility itself."

The first paper, by R. W. Ramsey on "Dynamics of Single Muscle Fibers," is concerned with the relation of tension to the length and configuration of the muscle fiber. The second paper, by A. S. Gilson, G. M. Schoepple and S. M. Walker, is concerned with the course of muscle tension during a response and the various time relations. The third paper, by E. Guth, is primarily concerned with the elastic properties of rubber and a comparison with the physical properties of muscle. In the fourth paper, S. W. Kuffler discusses the relation between changes in electrical potentials at the surface membrane and the initiation and maintenance of contraction. The fifth paper, by E. Fischer, is concerned with the study of muscle by double refraction, or birefringence. In the next paper, F. O. Schmidt, R. S. Bear, C. E. Hall and M. A. Jakus continue this discussion on the ultrastructure of muscle as revealed by the electron microscope and diffraction of roentgen rays.

The last five papers of this conference, by O. Myerhoff, S. Ochoa, H. B. Steinbach, S. C. Shen and A. Sandow, respectively, are concerned with the modern concept of the chemistry of muscular contraction. These papers supply a most thorough discussion of the breakdown of adenosine triphosphate in the liberation of energy in muscular contraction, of the relation of myosin to adenosine triphosphatase and of the effect of the adenosine triphosphatase in liberating free energy by influencing the breakdown of adenosine triphosphate to adenosine diphosphate.

This book makes available the most detailed and comprehensive presentation of the intrinsic anatomy and physiology of the muscle fiber. It is well documented and illustrated. It is a most commendable scientific publication, which does credit to the New York Academy of Sciences and to the progress of American science.

Infant Nutrition. By P. C. Jeans, M.D., and Williams McKim Marriott, M.D. Fourth edition. Price, $6.50. Pp. 516, with illustrations. St. Louis: C. V. Mosby Company, 1947.

This volume has deservedly become a standard work on infant nutrition, one of the "classics" of American pediatrics. As stated in the preface to the third and fourth editions, the book is intended to be useful to both students and practitioners, an intention which is admirably fulfilled. For use as a text, the material is presented with organization, logic and lucidity, while the inclusion of a great deal of practical detail makes the volume invaluable as a handy reference for the practicing physician. Because of the breadth of the subject essayed, the work must necessarily be encyclopedic. This scope unavoidably leads to overcondensation of some material and overweighting and unnecessary exposition of other subjects. A chapter devoted to "acid milk," for example, occupies more space than one proposing to cover the subject of "protein metabolism." The entire work is written with commendable conservatism and with proper restraint in recommending new, but not entirely established, concepts. A single exception is the chapter on breast feeding in which it is stated that "it is appropriate that mothers with a family history of cancer refrain from feeding their infants." Too little attention is paid to the psychologic aspects of infant feeding, and a "free election" feeding schedule is mentioned only to be condemned. The chapter devoted to care of the premature infant is incomplete in its discussion of nutrition, and the remainder of its content is out of place in this volume. The book would not suffer by its omission.

The book is well printed and well bound, as befits a volume of its value and importance.

Some Aspects of Red Cell Production and Destruction. By Eric Ponder, M.D., W. B. Cattle, H. A. Charipper, Ph.D., D. Dameshek, M.D., A. S. Gordon, Ph.D., S. Granick, Ph.D., and F. S. Robscheit-Robbins, Ph.D., Price, $2. Pp. 128, with illustrations. Reprinted from Annals of the New York Academy of Sciences, Volume XLVIII. New York: New York Academy of Medicine, 1947.

This concise but authoritative series of papers describes the manner in which red blood cells are produced and destroyed. The material was originally presented as a conference on red cell production and destruction held by the section of biology of the New York Academy of Sciences in 1946. The first paper is devoted to an excellent summary of the cytochemistry and architecture of the red blood cell by Eric Ponder, an authority in this field. The other chapters consider the relation of endocrine secretion to hemopoiesis, hemoglobin and red cell production in experimental anemia due to hemorrhage and the relation of iron and porphyrin metabolism to the red blood cell, together with etiologic and pathogenic mechanisms in macrocytic anemia and in hemolytic anemias. Each division of the monograph is covered comprehensively, but succinctly, by investigators whose work has been outstanding in their particular field. A well selected bibliography follows each presentation.

This collection of papers will certainly be of great interest to hematologists and to physicians interested in hematology. It is an excellent epitome of the more comprehensive contributions of these authors to the chemistry and physiology of hemopoiesis and the hemolytic states.

Directory of Pediatric Societies*

INTERNATIONAL

International Association of Preventive Pediatrics

President: Prof. S. Monrad, Dronning Louises Bornehospital, Copenhagen, Denmark.
Secretary: Dr. Daniel Oltramare, 15 Rue Lévrier, Geneva, Switzerland.

Sixth International Congress of Pediatrics

President: Prof. Guido Fanconi.
American Committee:
President: Dr. Henry F. Helmholz, Mayo Clinic, Rochester, Minn.
Secretary-General: Dr. L. Emmett Holt Jr., 477 First Ave., New York 16.
Canadian Committee:
Chairman: Dr. Alan Brown, Hospital for Sick Children, 67 College St., Toronto.
Secretary: Dr. S. G. Ross, 1390 Sherbrooke St. W., Montreal.
Place: Zurich, Switzerland. Time: July 24-28, 1950.

International Congress for the Protection of Infancy

Secretary: Prof. G. B. Allaria, Corso Bramante 29, Torino 120, Italy.

Pan American Congress of Pediatrics

President: Dr. Felix Hurtado, Habana Cuba.

International Union for Child Welfare

President: Mrs. Gordon Morier.
Secretary: Dr. Georges Thélin, 43 Quai Wilson, Geneva, Switzerland.

FOREIGN

Argentine Pediatric Society of Buenos Aires

President: Dr. Martin Ramón Arana, 1809 Rodriguez Peña, Buenos Aires.
General Secretary: Dr. Alfredo Larguia, Cerrito 1179, Buenos Aires.

Associacao Paulista de Medicina, Seccao de Pediatrias

President: Dr. Armando de Arruda Sampaio.
First Secretary: Dr. Luis Fontoura y Lauro Machado Oliveira, Caixa Postal 2103, São Paulo, Brazil.
Second Secretary: Dr. Luiz Augusto Monteiro Toledo, Av. Brigadeiro Luiz Antonio 393, 1° Andar, São Paulo, Brazil.
Time: Twelfth of every month, 8:30 p. m.

British Paediatric Society

President: Dr. H. T. Ashby, 13 St. John St., Manchester, England.
Joint Secretary: Prof. Alan Moncrieff, Hospital for Sick Children, Great Ormond St., London W. C. 1.
Place: Windermere.

Chinese Pediatric Society

President: Dr. W. S. Fu, The Shanghai Public Hospital for Children, 11 Hsiang Shan Road, Shanghai, China.
Secretary: Dr. T. F. Su, The Shanghai Public Hospital for Children, 11 Hsiang Shan Road, Shanghai, China.
Time: Concurrent with the annual conference of the Chinese Medical Association.

*Secretaries of societies are requested to furnish the information necessary to make this list complete and to keep it up to date.

Danish Pediatric Society

President: Prof. E. Lenstrup, Copenhagen.
Secretary: Dr. Gjorup, Dronning Louises Bornehospital, Copenhagen.

Nederlandsche Vereeninging voor Kindergeneeskunde

President: Dr. J. L. Keyzer, 114 St. Josephstr., Tilburg.
Secretary: Dr. H. Reerkink, c/o Sophia Kinderziekenhuis, 160 Gordelweg, Rotterdam.
Place: Children's Hospital or Pediatric Clinic. Time: Three times a year.

Palestine Jewish Medical Association, Section of Physicians of Children's Diseases

President: Prof. L. F. Meyer, 29 Toelsohn St., Tel Aviv.
Secretary: Dr. A. Brünn, 9 Maazestre, Tel Aviv.

Royal Society of Medicine, Section for the Study of Diseases in Children

President: Prof. J. M. Smellie, 5 Flat, 8 Bolingbroke Grove, London S. W. 11.
Secretary: Dr. Mary Wilmers; Dr. R. Bonham Carter.
Place: 1 Wimpole St., London W. 1. Time: Fourth Friday of each month, 4:15 p.m.

Schweizerische Gesellschaft fur Pädiatrie

President: Prof. Dr. A. Hottinger, Petersplatz 12, Basel.
Secretary: Dr. F. Hauser, Kinderspital, Basel.

Sociedad Boliviana de Pediatria

President: Dr. Carlos Ferrufino, Casilla 272, La Paz, Bolivia.
Secretary: Dr. Cecilio Abela Deheza, Bolivia.
Place: S. C. I. S. P. Bldg. Time: Every Thursday.

Sociedad Chilena de Pediatria

President: Mr. Raúl Matte, Santiago, Chile.
General Secretary: Dr. Mariano Latorre, Santiago, Chile.
Place: Medical Society, Santiago, Chile. Time: 7:30 p. m., weekly.

Sociedad Cubana de Pediatria

President: Prof. Agustin Castellanos.
Secretary: Dr. Carlos Hernandez Miyares, Hospital Nuestra Señora de las Mercedes L y 21, Apartado 2430, Habana.
Place: Cátedra de Clinica Infantil, Hospital Nuestra Señora de las Mercedes y Hospital Municipal de Infancia, Habana. Time: 9 p. m., last Wednesday of every month.

Sociedad Dominicana de Pediatria

President: Dr. Alberto Peguero, Avenida Bolivar 117, Ciudad Trujillo, R.D.
Secretary-Treasurer: Dr. Jaime Jorge, Lea de Castro 19, Ciudad Trujillo, R.D.
Place: Children's Ramfis Hospital. Time: 8 p. m., last Friday of every month.

Sociedad Ecuatoriana de Pediatria

President: Dr. Alfredo Ceballos Carrión.
Secretary: Dr. Rafael Compte Andrade, P. O. Box 3480, Guayaquil.
Place: Hospital Central. Time: 11:30 a. m., every Friday.

Sociedad Mexicana de Pediatria

President: Dr. Jesus Avarez de los Cobos.
Secretary: Dr. Luis Torregrosa F.
Place: Hospital Infantil. Time: Last Thursday of every month.

SOCIEDAD DE PEDIATRÍA DE CONCEPCIÓN (CHILE)

President: Dr. Raúl Ortega A., Hospital Clínico Regional, Concepción.
Secretary: Dr. Fidel Urrutia, Hospital Clínico Regional, Concepción.
Place: Hospital Clínico Regional, Concepción. Time: 7:30 p. m., Second Tuesday of every month from April to December, inclusive.

SOCIEDAD DE PEDIATRÍA DE CÓRDOBA

President: Dr. Juan Francisco Herrera, Córdoba, Argentina.
Secretary: Dr. Albino F. Dottori, Dean Fumes 2000, Esq. Ocaña (N.), Córdoba, Argentina.
Place: Comite pro Defenso del Niño, Dean Fumes 2000, Córdoba, Argentina.
Time: Once a month.

SOCIEDAD DE PEDIATRIA DEL LITORAL

President: Dr. Jose E. Celoria, Hospital Centenario, Rosario, Argentina.
Secretary: Dr. Gloria Lovell, Hospital Centenario, Rosario, Argentina.

SOCIEDAD DE PEDIATRÍA DE SANTIAGO DE CUBA

President: Dr. Antonio Béguez Cèsar, Sagarra 107, Santiago de Cuba.
Secretary: Dra. Susana Texdó Vaillant, Padre, Pico 57, Santiago de Cuba.
Place: Colegio Médico. Time: Last Tuesday of every month.

SOCIEDAD VENEZOLANA DE PUERICULTURA Y PEDIATRIA

President: Dr. Pastor Oropeza, Caracas.
Secretary: Dr. Guillermo Flores, Chacin, Sur 17, no. 26-2, Caracas.
Place: Hospital Municipal de Niños, Caracas. Time: Once a month.

SOCIEDAD YUCATECA DE PEDIATRIA

President: Dr. José Lavalle, Yucatan, Mexico.
Secretary: Dr. Francisco Solís, Yucatan, Mexico.
Place: Hospital del Niño, Yucatan, Mexico.

SOCIÈTÈ DE PÈDIATRIE DE PARIS

President: Dr. G. Heuyer, 1 Ave. Emile Deschanel, Paris 7°, France.
Secretary: Dr Maurice Lamy, 94 rue de Varenne, Paris 7°, France.
Place: Hôpital des Enfants Maladies, 149 Rue de Sèvres. Time: 4:30 p. m., third Thursday of every month.

SOUTH AFRICAN PAEDIATRIC ASSOCIATION

Chairman: Dr. Basil Melle, 89 Lister Bldg., 195 Jeppe St., Johannesburg, South Africa.
Secretary-Treasurer: Dr. Seymour Heymann, 17 Lister Bldg., 195 Jeppe St., Johannesburg, South Africa.

SWEDISH MEDICAL SOCIETY, SECTION FOR PEDIATRICS AND SCHOOL HYGIENE

President: Dr. R. Hybbinette, Kommendorsgatan 3, Stockholm.
Secretary: Dr. B. Broman, Eriksbergsgatan 1A, Stockholm.
Place: Various clinics and hospitals in Stockholm and Uppsala. Time: Second Friday of each month (except summer).

URUGUAYAN SOCIETY OF PEDIATRICS

President: Dr. Héctor C. Bazzano.
Secretary: Dr. José M. Portillo.
Place: Club Medico del Uruguay, Avenda Agraciada 1464 (Piso 13), Montevideo.

NATIONAL

AMERICAN MEDICAL ASSOCIATION, SCIENTIFIC ASSEMBLY, SECTION ON PEDIATRICS

Chairman: Dr. Woodruff L. Crawford, 321 W. State St., Rockford, Ill.
Secretary: Dr. Margaret Mary Nicholson, 1801 Eye St. N. W., Washington, D. C.
Place: Atlantic City, N. J. Time: June 6-10, 1949.

American Academy of Pediatrics

President: Dr. Warren R. Sisson, 319 Longwood Ave., Boston 15.
Secretary: Dr. Clifford G. Grulee, 636 Church St., Evanston, Ill.
Place: Atlanta, Ga. Time: April 13-15, 1949.
Annual Meeting: Place: San Francisco. Time: Nov. 14-17, 1949.

American Hospital Association, Massachussetts Hospital Association

Chairman: Dr. Frank Wing, Boston.
Secretary: Dr. W. Franklin Wood, McLean Hospital, Waverly 79, Mass.

American Pediatric Society

President: Dr. Valjean Cooke, 8700 Argyle Ave., St. Louis.
Secretary-Treasurer: Dr. Henry G. Poncher, 1819 W. Polk St., Chicago 12.
Place: Atlantic City. Time: May 3-5 (?), 1949.

Canadian Society for the Study of Diseases of Children

President: Dr. P. E. Williams, 193 James St. S., Hamilton, Ontario.
Secretary-Treasurer: Dr. R. L. Denton, 1615 Cedar Ave., Montreal.

Society for Pediatric Research

President: Dr. Sidney Farber, 300 Longwood Ave., Boston.
Secretary: Dr. Robert Ward, Bellevue Hospital, New York 16.

SECTIONAL

Intermountain Pediatric Society

President: Dr. Spencer Snow, 75 S. Main St., Salt Lake City.
Secretary-Treasurer: Dr. Esther Gross, 202 E. South Temple St., Salt Lake City.
Place: Salt Lake City General Hospital. Time: First Thursday of each month, 8 p. m.

New England Pediatric Society

President: Dr. Howard W. Brayton, 179 Allyn Street, Hartford 3, Conn.
Secretary-Treasurer: Dr. Harry Shwachman, 300 Longwood Ave., Boston.
Place: Boston Medical Library. Time: Three meetings a year, occurring from September to May.

North Pacific Pediatric Society

President: Dr. Clarence L. Lyon, 407 Riverside Ave., Spokane 8, Wash.
Secretary: Dr. Aldis B. Johnson, 515 Cobb Bldg., Seattle, Wash.

Northwestern Pediatric Society

President: Dr. Paul Bancroft, 909 Sharp Bldg., Lincoln, Neb.
Secretary-Treasurer: Dr. Northrop Beach, 1009 Nicollet Ave., Minneapolis.
Place: Minneapolis, St. Paul, Duluth and Rochester. Time: January, April, July and October.

Rocky Mountain Pediatric Society

President: Dr. Wm. D. Rothwell, Jr., Republic Bldg., Denver.
Secretary: Dr. Edwin T. Williams, 1850 Gilpin St., Denver 6.
Place: Children's Hospital of the Colorado General Hospital. Time: Monthly from October to June.

Southern Medical Association, Section of Pediatrics

Chairman: Dr. Carroll M. Pounders, 1200 N. Walker St., Oklahoma City.
Secretary: Dr. Samuel F. Ravenel, 371 N. Elm St., Greensboro, N. C

STATE

Alabama Pediatric Society

President: Dr. W. A. Daniel, Jr., 115 S. Union St., Montgomery 5, Ala.
Secretary-Treasurer: Dr. D. B. Monsky, 905 Norman Bridge Rd., Montgomery 6, Ala.
Place: Montgomery, Ala. Time: September 1949.

Arizona Pediatric Society

President: Dr. Hugh Thompson Jr., 110 S. Scott St., Tucson, Ariz.
Secretary: Dr. James R. Sickler, Physicians Bldg., Tucson, Ariz.
Place: Phoenix or Tucson. Time: On call.

Arkansas State Pediatric Association

Chairman: Dr C. B. Billingsley, 1425 N. 11th St., Fort Smith.
Secretary: Dr. R. E. Weddington, 1425 N. 11th St., Fort Smith.

California State Medical Society, Section on Pediatrics

Chairman: Dr. Alice Potter, 1418 Ninth Ave., San Francisco 22.
Secretary: Dr. Carl Erickson, 595 E. Colorado, Pasadena.
Place: Los Angeles. Time: April 1949.

Florida State Pediatric Society

President: Dr. Edgar W. Stephens, 910 Harvey Bldg., West Palm Beach.
Secretary: Dr. Hugh A. Carithers, 2000 Park St., Jacksonville 4.
Place: Concurrent with state association convention and fall meeting.

Georgia Pediatric Society

President: Dr. Lee Bivings, 20 Fourth St. N. W., Atlanta.
Secretary-Treasurer: Dr. Don F. Cathcart, 478 Peachtree St. N. E., Atlanta.
Place: Atlanta. Time: At time of annual state meeting.

Hezekiah Beardsley Pediatric Club of Connecticut

President: Dr. H. L. F. Locke, 179 Allyn St., Hartford, Conn.
Secretary: Dr. L. W. Minor, 119 Main St., Middletown, Conn.

Illinois State Medical Society, Section on Pediatrics

Chairman: Dr. Eugene T. McEnery, 4458 W. Madison St., Chicago 24.
Secretary: Dr. George L. Drennen, Jacksonville, Ill.
Place: Palmer House, Chicago. Time: May 10-12, 1949.

Indiana State Pediatric Society

President: Dr. K. T. Knode, 1105 E. Jefferson Bldg., South Bend.
Secretary-Treasurer: Dr. Matthew Winters, 621 Hume Mansur Bldg., Indianapolis.
Time: Two meetings a year.

Iowa Pediatric Society

President: Dr. Charlotte Fisk, 1201 Equitable Bldg., Des Moines 9.
Secretary-Treasurer: Dr. James Dunn, Davenport Bank Bldg., Davenport.
Place: Des Moines. Time: April 1949.

Louisiana State Pediatric Society

President: Dr. William C. Rivenbank, 1448 Louisiana Ave., New Orleans 15.
Secretary-Treasurer: Dr. Bertha Wexler, 3439 Prytania St., New Orleans 15.
Place: New Orleans. Time: May 7, 1949.

Medical Society of the State of New York, Pediatric Section

Chairman: Dr. Carl H. Laws, 12 Pierrepont St., Brooklyn.
Secretary: Dr. George R. Murphy, 292 Madison Ave., New York.

Medical Society of the State of Pennsylvania, Pediatric Section

Chairman: Dr. Waldo E. Nelson, Temple University, Philadelphia 40.
Secretary: Dr. Carl C. Fischer, 100 W. Coulter St., Philadelphia 44.

Michigan State Medical Society, Pediatric Section

Chairman: Dr. H. J. Lewis, 2956 Biddle Ave., Wyandotte.
Secretary: Dr. Robert H. Trimby, 122 W. Hillsdale, Lansing.

Mississippi State Pediatric Society

President: Dr. Harvey F. Garrison Jr., 315 E. Capitol Place, Jackson.
Secretary: Dr. Guy Verner, 126 N. Congress St., Jackson.

Nebraska Pediatric Society

President: Dr. George Clark, 1817 Vinton St., Omaha.
Secretary-Treasurer: Dr. Michael Crofoot, 1407 Medical Arts Bldg., Omaha 2.
Place: Children's Memorial Hospital. Time: Third Thursday of each month from October to June, inclusive. Dinner at 6 p. m.

New Jersey Medical Society, Pediatric Section

Chairman: Dr. Robert E. Jennings, 117 Washington St., East Orange.
Secretary: Dr. Israel J. Wolf, 231 E. 31st St., Paterson.

New Mexico State Pediatric Society

President: Dr. M. K. Wylder, 221 W. Central Ave., Albuquerque.
Secretary-Treasurer: Dr. Ly Werner, 221 W. Central Ave., Albuquerque.

North Carolina Pediatric Society

President: Dr. Samuel F. Ravenel, 371 N. Elm St., Greensboro, N. C.
Secretary: Dr. Charles H. Gay, 1523 Elizabeth Ave., Charlotte, N. C.

Northern California Pediatric Society

President: Dr. William C. Deamer, 3 Fifth Ave., San Francisco 18.
Secretary: Dr. A. L. Gleason, 1066 Longridge Rd., Oakland 10.
Place: San Francisco. Time: Second Thursday of February, April, September and November.

Oklahoma State Pediatric Society

President: Dr. J. B. Snow, 625 N. W. 10th St., Oklahoma City.
Secretary: Dr. Bertha Levy, 1200 N. Walker St., Oklahoma City.
Place: With Oklahoma State Medical Association. Time: Annual Meeting.

Philippine Pediatric Society

President: Dr. Alberto V. Tupas, Department of Pediatrics, College of Medicine, University of the Philippines, Manila, Philippines.
Secretary: Dr. Artemio P. Jongco, Department of Pediatrics, College of Medicine, University of the Philippines, Manila, Philippines.
Place: Philippine General Hospital. Time: Every two months.

South Carolina Pediatric Society

President: Dr. B. Owen Ravenel, 95 Rutledge Ave., Charleston 16.
Secretary-Treasurer: Dr. John R. Harvin, 206 N. Sumter St., Sumter.

Tennessee Pediatric Society

President: Dr. W. O. Vaughan, 2103 Hayes St., Nashville 5.
Secretary-Treasurer: Dr. C. Barton Etter, 1678 Peach, Memphis 12.
Place: Chattanooga. Time: Second Monday in April.

Texas Pediatric Society

President: Dr. John K. Glen, 4412 Montrose St., Houston.
Secretary-Treasurer: Dr. James N. Walker, 3616 Tulsa Way, Fort Worth 7.
Place: San Antonio. Time: Oct. 7-8, 1949.

Virginia Pediatric Society

President: Dr. C. P. Brown, 142 W. York St., Norfolk.
Secretary: Dr. E. Berkeley Neal, 303 Washington Ave. S. W., Roanoke.

West Virginia State Medical Society, Section on Pediatrics

President: Dr. Thomas G. Folsom, 1139 Fourth Ave., Huntington.
Secretary: Dr. Warren J. Parsons, 425 Eleventh St., Huntington.

Wisconsin State Medical Society, Section on Pediatrics

Chairman: Dr. M. G. Peterman, 411 E. Mason St., Milwaukee 2.
Secretary: Dr. L. M. Simonson, 1001 N. 8th St., Sheboygan.

LOCAL

Academy of Medicine of Cleveland, Pediatric Section

Chairman: Dr. John Hart Davis, 10515 Carnegie Ave., Cleveland.
Secretary: Dr. Francis F. Silver, 9400 Euclid Ave., Cleveland.
Place: Allen Memorial Medical Library. Time: 8:15 p. m., October, December, February and April.

Academy of Medicine, Toronto, Section of Pediatrics

President: Dr. A. L. Chute, 170 St. George St., Toronto, Canada.
Secretary: Dr. John Fletcher, 262 St. Clair St. W., Toronto, Canada.
Place: Academy of Medicine. Time: 8:30 p. m., third Thursday of each month.

Baltimore City Medical Society, Pediatric Section

Chairman: Dr. Charles O'Donovan Jr., 5 E. Read St., Baltimore.
Secretary: Dr. T. Campbell Goodwin, 16 E. Biddle St., Baltimore.

Bronx Pediatric Society

President: Dr. Harry S. Pizer, 1726 Davidson Ave., New York.
Secretary: Dr. William A. Schonfeld, 211 W. 106th St., New York 25.
Place: Morrisania City Hospital. Time: 8:30 p. m., second Wednesday of each month, except June, July, August and September.

Brooklyn Academy of Pediatrics

President: Dr. Walter R. Coles, 604—2d St., Brooklyn.
Secretary: Dr. Bernard Benjamin, 845 Park Pl., Brooklyn 16.
Place: Granda Hotel. Time: 8:45 p. m., fourth Wednesday of February, March, April, October and November.

Buffalo Pediatric Society

President: Dr. Douglas P. Arnold, 159 Bidwell Parkway, Buffalo, N. Y.
Secretary: Dr. Richard A. Downey, 786 Forest Ave., Buffalo 9, N. Y.
Place: Children's Hospital, 219 Bryant St. Time: 8:30 p. m., first Monday of each month from September to June.

Central New York Pediatric Club

President: Dr. T. Wood Clarke, 7 Cottage Place, Utica.
Secretary: Dr. Frank J. Williams, 58 S. Swan St., Albany.
Place: Various cities in New York. Time: Third Tuesday of April and October.

Chicago Pediatric Society

President: Dr. John L. Reichert, 1791 Howard St., Chicago 26.
Secretary: Dr. Alvah L. Newcomb, 723 Elm St., Winnetka, Ill.
Place: Children's Memorial Hospital, 710 Fullerton Ave. Time: Third Tuesday of each month, October to May inclusive.

Cincinnati Pediatric Society

President: Dr. John H. Hunt, Kemper Lane Bldg., Cincinnati.
Secretary: Dr. William F. Hunting, 6048 Montgomery, Cincinnati.
Place: Children's Hospital, Elland Ave., Cincinnati. Time: On call.

Dallas Pediatric Society

President: Dr. Guy Hacker, 5711 Goliad St., Dallas.
Secretary-Treasurer: Dr. George R. Branch, 4325 Cole Ave., Dallas.
Place: Children's Hospital of Texas and Bradford Memorial Hospital. Time 1 p. m., third Saturday and 8:30 p. m., the first Tuesday of each month.

Detroit Pediatric Society

President: Dr. Harold B. Rothbart, 773 Fisher Bldg., Detroit 2.
Secretary: Dr. S. S. Bernstein, 650 Maccabees Bldg., Detroit.
Place: Variable. Time: Five times annually.

Fort Worth Pediatric Society

President: Dr. Frank Cohen, 712 S. Henderson, Forth Worth, Texas.
Secretary: Dr. H. H. Womack, 1422 Pennsylvania, Forth Worth, Texas.
Place: Welch and West Restaurant. Time: Third Friday of each month.

Honolulu Pediatric Society

President: Dr. Donald Marshall, Medical Group, Honolulu.
Secretary-Treasurer: Dr. Teruo Yoshina, 1221 Victoria St., Honolulu.

HOUSTON PEDIATRIC SOCIETY

President: Dr. Edward O. Fitch, 3720 Fannin St., Houston, Texas.
Secretary: Dr. Thomas J. Donovan, 3506 Sunset Blvd., Houston 5, Texas.
Place: River Oaks Country Club. Time: 7:30 p. m., last Tuesday of each month.

KANSAS CITY (MISSOURI) PEDIATRIC SOCIETY

President: Dr. Harry M. Gilkey, 1624 Professional Bldg., Kansas City.
Secretary: Dr. Leland Speer, 1022 Hoel Parkway, Kansas City.
Place: Kansas City General Hospital. Time: On call.

KNOXVILLE-OAK RIDGE PEDIATRIC SOCIETY

President: Dr. Henry S. Christian, 205 Medical Arts Bldg., Knoxville, Tenn.
Secretary: Dr. John Eggleston, Oak Ridge Hospital, Oak Ridge, Tenn.

LOS ANGELES COUNTY MEDICAL ASSOCIATION, PEDIATRIC SECTION

President: Dr. Elena Boder, 1830½ Lucille Ave., Los Angeles 26.
Secretary-Treasurer: Dr. Robert Simonds, 267 S. Beverly Dr., Beverly Hills, Calif.
Place: Los Angeles County Medical Association Bldg., 1925 Wilshire Blvd. Time: Second Monday of February, April, June, October and December.

MEDICAL SOCIETY OF THE COUNTY OF KINGS AND THE ACADEMY OF MEDICINE OF BROOKLYN, PEDIATRIC SECTION

President: Dr. Harold Levy, 750 St. Marks Ave., Brooklyn 16.
Secretary: Dr. Jacob J. Lichterman, 1433 Union St., Brooklyn 13.
Place: 1313 Bedford Ave., Brooklyn. Time: 9:00 p. m., fourth Monday of each month.

MEDICAL SOCIETY OF THE DISTRICT OF COLUMBIA, SECTION ON PEDIATRICS

President: Dr. John Washington, 2032 Belmont Rd. N.W., Washington, D. C.
Secretary-Treasurer: Dr. George Maksim, 1418 Good Hope Rd. S. E., Washington, D. C.
Place: Medical Society Bldg., 1718 M St. N.W. Time: Spring and fall.

MEMPHIS PEDIATRIC SOCIETY

President: Dr. C. Barton Etter, 1678 Peach, Memphis 12, Tenn.
Secretary-Treasurer: Dr. Jacob Danciger, 188 S. Bellevue Blvd., Memphis 4, Tenn.
Place: University Center, 4 S. Dunlap. Time: 7 p. m., second Tuesday of every month.

MILWAUKEE PEDIATRIC SOCIETY

President: Dr. James Conway, 1721 E. Lake Bluff Blvd., Milwaukee 11, Wis.
Secretary-Treasurer: Dr. Walter Polacheck, 425 E. Wisconsin Ave., Milwaukee 2, Wis.
Place: City Club of Milwaukee. Time: Second Wednesday in February, April, June, October and December.

NASHVILLE PEDIATRIC SOCIETY

President: Dr. John M. Lee, Doctors Bldg., Nashville, Tenn.
Secretary: Dr. Dan S. Sanders, Jr., 2103 Hayes St., Nashville, Tenn.
Time: Third Thursday of every month.

NEW YORK ACADEMY OF MEDICINE, SECTION ON PEDIATRICS

Chairman: Dr. John Dorsey Craig, 120 E. 75th St., New York 21.
Secretary: Dr. Morris Greenberg, 143 W. 87th St., New York.
Place: New York Academy of Medicine, 2 E. 103d St. Time: Second Thursday of each month from November to May, inclusive, 8:30 p. m.

OKLAHOMA CITY PEDIATRIC SOCIETY

President: Dr. Bertha M. Levy, 717 N. W. 22d St., Oklahoma City 3.
Secretary: Dr. C. M. Bielstein, 301 N. W. 12th St., Oklahoma City 3.
Place: Oklahoma Club. Time: On call.

PHILADELPHIA PEDIATRIC SOCIETY

President: Dr. Milton Rapoport, 741 S. 3d St., Philadelphia.
Secretary: Dr. D. Stewart Polk, W. Montgomery Ave., Rosemont, Pa.
Place: College of Physicians, 19 S. 22d St. Time: 8:30 p. m., second Tuesday from October to May, inclusive.

Pittsburgh Pediatric Society

President: Dr. J. A. Gilmartin, 3708-15th Ave., Pittsburgh.
Secretary-Treasurer: Dr. C. J. Stoecklein, Medical Arts Bldg., Pittsburgh 13.
Place: Municipal Hospital, Pittsburgh. Time: Second Friday in October, December, February and April.

Queens Pediatric Society

Chairman: Dr. Walter C. A., Steffen, 42-28 Union St., Flushing, N. Y.
Secretary-Treasurer: Dr. Louis Appel, 33-03 Parsons Blvd., Flushing, N. Y.
Place: Forest Hills, N. Y. Time: Third Monday of October, February, April; first Monday of December.

Richmond Pediatric Society

President: Dr. Thomas S. Chalkley, 421 W. Grace St., Richmond 20, Va.
Secretary-Treasurer: Dr. John Paul Jones, 810 W. Franklin St., Richmond 20, Va.
Place: Medical College Hospital. Time: 8 p. m., third Thursday of each month, except June, July and August.

Rochester Pediatric Society

President: Dr. Jerome Glaser, 85 San Gabriel Dr., Rochester 10, N. Y.
Secretary-Treasurer: Dr. Daniel B. Peeler, 1162 Lake Ave., Rochester 13, N. Y.
Place: Rochester Academy of Medicine or arrangement by program committee.
Time: Third Friday of each month from October to May.

St. Louis Pediatric Society

President: Dr. Merl J. Carson, 500 S. Kingshighway, St. Louis.
Secretary-Treasurer: Dr. Jackson K. Eto, 734 Missouri Theatre Bldg., St. Louis 3.
Place: Hotel Branscome. Time: Second Thursday of each month from October to May, inclusive, 6:30 p. m.

San Antonio Pediatric Society

President: Dr. Lucius Hill, 328 Medical Arts Bldg., San Antonio 5.
Secretary-Treasurer: Dr. Edith M. Bonnet, 228 Medical Arts Bldg., San Antonio 5.
Place: Bexar County Medical Library. Time: 7:30 p. m., first Tuesday of every month.

Seattle Pediatric Society

President: Dr. Sherod M. Billington, Medical Dental Bldg., Seattle 1.
Secretary: Dr. Jack M. Doctor, 738 Broadway, Seattle 22.
Place: College Club. Time: Fourth Friday of each month from September to June at 6:30 p. m.

Southwestern Pediatric Society

President: Dr. Harry F. Dietrich, 416 N. Bedford Dr., Beverly Hills, Calif.
Secretary: Dr. Clement H. Maloney, Beverly Hills, Calif.
Place: University Club of Los Angeles. Time: 6:30 p. m., second Wednesday in January, March, May, September and November.

University of Michigan Pediatric and Infectious Disease Society

President: Dr. Ernest H. Watson, University Hospital, Ann Arbor.
Secretary: Dr. Harry A. Towsley, 1313 E. Ann St., Ann Arbor.

Waco Pediatric Society

President: Dr. M. C. Carlisle, 1410 Austin Ave., Waco, Texas.
Secretary: Dr. F. W. Hoehn, 1422 Austin Ave., Waco, Texas.
Place: Provident Hospital, 1725 Colcord, Waco, Texas. Time: Third Thursday of each month.

Westchester County Medical Society, Pediatrics Section (New York)

President: Dr. Harry W. Kaessler, 147 Prospect Ave., Mount Vernon, N. Y.
Secretary-Treasurer: Dr. Elvira Ostlund, 64 Highland Rd., Rye, N. Y.
Place: The Roger Smith Hotel, White Plains, N. Y. Time: Fourth Thursday of every other month from September to June (dinner meetings).